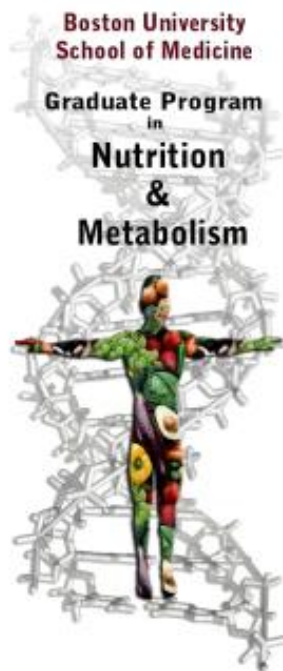

GUIDE FOR MASTER'S STUDENTS

GRADUATE PROGRAM

In

NUTRITION and METABOLISM

Boston University School of Medicine
Division of Graduate Medical Sciences



Revised August 2014

Division of Graduate Medical Sciences, Boston University School of Medicine

GRADUATE PROGRAM IN NUTRITION AND METABOLISM

GUIDE FOR MASTER'S STUDENTS

Welcome to the Graduate Program in Nutrition and Metabolism (N & M). This guide summarizes the requirements for Master's-level graduate study in the N & M and provides other helpful information as well. Additional documents regarding academic policies and procedures, course registration and the like are available through the Division of Graduate Medical Sciences (DGMS) website (see Section XI). *This Guide is subject to ongoing review and change with the approval of the Program Directors and Executive Committee.*

Please note that students are responsible for checking the GMS website for all academic deadlines (add, drop, etc) and due dates for forms (e.g. full time certification, graduation forms, thesis submission requirements).

I. PROGRAM CONTACTS AND COMMITTEES

Program Director & Co-Director

Susan K. Fried, Program Director, PhD, Professor, Dept. of Medicine, Section of Endocrinology, Diabetes and Nutrition. She can be contacted at skfried@bu.edu or at 617 638-7110. Her office is in the EBRC), 650 Albany Street, Room 815 (also called X-building).

Lynn L. Moore, Co-Director, PhD, Associate Professor, Dept. of Medicine, Section of Preventative Medicine & Epidemiology. She can be contacted at lmoore@bu.edu or at (617) 638-8088. Her office is in the Crosstown Building at 801 Massachusetts Ave., Suite 470.

Administrator

Eddy Gao (dqao@bu.edu) Coordinates Admissions and Student Records. . His office is in the Crosstown Building at 801 Massachusetts Ave., Suite 470.

Admissions Committee: In accordance with the regulations of the Division of Graduate Medical Sciences, the Admissions Committee directs the admissions process and selects students for the program. The Committee will verify the academic credentials of incoming students. The Committee assists in identifying sources of funding for incoming students.

Curriculum Committee:

This Committee oversees the curriculum for the N&M students as well as the academic progress of individual students, including approving progress reports, and requests for exemptions from requirements because of prior course work. This committee routinely reviews the curriculum and may identify areas requiring modification or improvement, current topics to be added to the curriculum. They report to full faculty at least annually, and make recommendations for curriculum changes.

This Committee monitors the progress of each student before and after the satisfactory completion of coursework and throughout the completion of the Master's thesis. The Committee evaluates each student's progress at least annually. The Committee may make specific recommendations regarding student programs and progress. The Committee may also

recommend dismissing a student from the program if academic performance or research progress is unsatisfactory.

II. ADVISORS

Program Advisor:

Upon entry into the program, each student is assigned an appropriate faculty advisor who will assist the student with course selection, determining how program requirements will be met, identifying a thesis topic and potential thesis advisor, and any academic or related issues that may arise.

Thesis Advisors:

Sometime after the end of the first semester of study, the student will choose a thesis advisor with guidance from the academic Program Advisor and one of the Program Directors. The thesis advisor and thesis committee members must be approved by one of the Program Directors.

III. COURSE OF STUDY

Overview of Degree requirements for the MA degree:

To earn the M.S., you must complete a minimum of 28 course credits (including the Core classes) plus 4 research credits (for a total of 32 credits), and write and defend a thesis under the guidance of an approved faculty member.

Master's Thesis: The thesis should be written as a research paper in the style of a peer-reviewed journal typical for the field of study, with the exception that the Introduction in particular should be longer than that of a typical published manuscript in your field of study. There are no page requirements, but the usual format is: Introduction (4-7 pages), Materials and Methods (4-7 pages), Results, with tables and figures (5-10 pages), and Discussion (5-7 pages), for a total of 20 to 30 pages (double spaced). The Introduction should be written to establish 'why is the problem important', 'what is known and what is not', as a last paragraph of the Introduction should formally state the 'Goals of the thesis'. *The guidelines of GMS for formatting and submissions must be followed.* The instructions are posted on the GMS website, and the GMS office can provide guidance as needed.

You are expected to start research for the thesis in the Spring semester at the latest.

The thesis topic and general plan is initially agreed upon with your thesis advisor. You must then submit a brief (approximately one page) written proposal, signed by you and your advisor and provided to the Curriculum Committee through one of the program directors.

Master's Thesis Committee: You and your advisor will agree upon two readers for your thesis, but additional members can and should be added to your committee as needed for needed additional or special expertise. Readers can provide advice and guidance throughout the research, and help evaluate progress and requirements for completion.

Public Presentation of the Masters thesis: You should present your work at a Nutrition Seminar sometime during the year, usually at the completion of your thesis.

Defense of the Thesis: After delivering a public seminar on your thesis work, you will meet with your committee in private and answer questions for 30-40 minutes. You are expected to know

the literature, understand the methods you used and results generated, and to discuss the implications of your work. Upon successful completion of this question/answer period, you will be finished!

Forms and GMS requirements: You are responsible for being aware of all GMS regulations and taking care of all paperwork required by GMS for the write-up, approval and deposition of your thesis. You must plan in advance so that you obtain all of the necessary signatures and meet all of the required deadlines. You should familiarize yourself with all GMS regulations for enrollment and graduation. Please note that you must be registered for 2 consecutive semesters including the one when you hand in your thesis.

COURSEWORK

Our Core coursework provides you with knowledge of basic nutrition principles, biochemistry, epidemiology, and statistics. Please see course descriptions, sample schedules and scheduling information at the end of this handbook. Depending upon your specific interests, academic and career goals, electives should be selected in consultation with your advisor.

CORE COURSES (required)

NUTRITION:

GMS NU 755 Molecular, Biochemical and Physiologic Bases of Nutrition I: Energy Balance and Micronutrients (*Prerequisite: at least one semester each of biochemistry and physiology, or equivalent, and permission of the instructor*)

This is the first semester of a 2 semester sequence (that can be taken in either order) that focuses on the Physiological, Biochemical and Molecular Bases of Nutrition. This semester will cover concepts of essential nutrients and methods for determining their requirements (DRIs), body composition, nutrition and growth, energy expenditure, regulation of energy intake, vitamins and macro-mineral metabolism (Ca, P) and micronutrients. Functions and roles of micronutrients in signaling from gene to whole organism will be discussed. Implications for nutrient requirements through the lifecycle and in health and disease will be addressed. A discussion session will teach students to critically evaluate cutting-edge and seminal papers addressing each topic, and introduce students to state of the art research approaches and methodologies – basic (cell and molecular), clinical and epidemiological. Weekly writing assignments on the papers will provide experience and hone skills with scientific writing. (*Fried, 4 cr, Fall*)

GMS NU 756 Molecular, Biochemical and Physiologic Bases of Nutrition: Macronutrients (*Prerequisite: at least one semester each of Biochemistry and Physiology and permission of the instructor*) Regulation of lipid, carbohydrate, and protein digestion, absorption, transport, tissue and cellular metabolism. Integration of macronutrient metabolism in response to alterations in nutritional status (e.g. starvation, obesity) in the whole body, specific tissues, and specific types of cells. Mechanisms regulating macronutrient metabolism in response to stresses such as exercise and aging and disease will also be covered. A discussion session will teach students to critically evaluate research papers, provide knowledge of seminal papers in the field, and introduce students to research approaches and state of the art methods (e.g. assessment of metabolic flux using stable isotopes, euglycemic clamps, metabolomics). (*Fried, 4 cr, Spring*).

GMS NU 620 Clinical Nutrition Research (*Prereq: Human Physiology or equivalent, consent of instructor. Prereq or Coreq NU 755 or 756*).

The course will focus on disease states related to nutrition and diet, with a major focus on clinical nutrition research. The course objectives focus on the following: (a) current concepts and methods in clinical nutrition research, (b) methodologic approaches to nutrition-related research questions, (c) role of diet/nutrition in the development, prevention and treatment of major diseases. (*Moore, 3 cr*)

GMS NU 804 Directed study (variable credits).

This course number can be used for multiple purposes by arrangement.

In the Fall 2014 semester, under this number, Dr. Moore will offer:

Research Design and Statistical Methods for Biomedical Sciences (2 or 3 credits by arrangement)

The overall objective of this course is to provide students with an understanding of basic concepts of research design and data analysis in the biomedical sciences. The primary didactic areas to be covered include framing hypotheses and objectives, the use of experimental designs and, to a lesser degree, non-experimental designs, problems of differential and non-differential error (including bias and confounding), foundational principles of data description and analysis (independent vs. correlated, parametric and non-parametric, measures of central tendency and dispersion), effect estimation, the use and limitations of statistical testing, and univariable vs. multivariable modeling. The course employs both didactic sessions and in-class discussion.

Note: THIS COURSE SATISFIES OUR MINIMAL REQUIREMENT FOR STATISTICS AND EPIDEMIOLOGY.

Note: Equivalent courses are acceptable with permission of the curriculum committee.

GMS NU 700 Nutrition & Metabolism Seminar: Students develop and present a research seminar. (*Fried and Moore 2 cr, Spring*).

GMS NU 901, 902 Research in Nutrition and Metabolism. This course number is used during the period of your dissertation research. (*Variable cr, any semester*)

BIOCHEMISTRY:

GMS BI 751 or BI752 Biochemistry and Cell Biology (Fall)

Prereq: consent of instructor. Basic principles and concepts of graduate level biochemistry in a one-semester course. Instruction includes protein structure and function; mechanisms of enzyme action; carbohydrate and lipid metabolism; bioenergetics; metabolism of amino acids and nucleotides; DNA and RNA synthesis, structure and function; and regulation of gene expression. (*Offner, 6 cr or 4cr, 1st sem*). Note: the 4 credit version starts in October when the class starts in with metabolism (so does not include [proteins/enzymes/cytoskeleton/connective tissue](#)) . If you are a premed, you likely want to take the 6 credit version, but it is not necessary.

EPIDEMIOLOGY, BIOSTATISTICS AND EXPERIMENTAL DESIGN (*electives – should be considered if you want to focus on clinical nutrition or nutritional epidemiology*)

GMS CI 670 Biostatistics with Computer

Prereq: consent of instructor. This course is designed for Clinical Research Associates and other students with no prior experience with statistics who want to utilize computer software in performing statistical analysis. Topics include the collection, classification, and presentation of descriptive data; the rationale of hypothesis testing; experimental design; t-tests; correlation and regression analysis; and analysis of contingency tables. Laboratory course. (*Fall Semester, 4 credits, T. Trivison*)

SPH EP 713 Introduction to Epidemiology (*3 cr, Fall*)

Epidemiology is a methodology that enables public health professionals to identify the determinants of health, disease and injury in human populations and provides a means of assessing the magnitude of public health problems and the success of interventions designed to control them. It is essential for understanding and solving public health problems, regardless one's area of concentration or specialization. The goals of EP713 are to introduce the basic principles and methods of epidemiology and demonstrate their applicability to public health; to provide fundamental skills needed to interpret and critically evaluate literature relevant to public health professionals; and to provide a structured method for organizing and analyzing raw data and to enable students to interpret and communicate the results to public health professionals and to the general public. Classes generally utilize a lecture format, but lectures are interspersed with active learning exercises consisting of a mixture of in-class problems, exercises, and discussions. The course uses online and independent learning modules that will further enable students to achieve the learning objectives. (*LaMorte, Brogly, & Shea, 3 cr. either sem*)

SPH EP758 Nutritional Epidemiology.

(Prerequisite for this course is SPH EP 711 or 712. EP 712 is recommended for Master's candidates intending to work in the epidemiology or related fields)

The course introduces students to the discipline of nutritional epidemiology. It focuses on methodologic issues relating to design, dietary assessment, and data analysis of studies on diet and disease. The course also reviews some literature relating nutrition to certain disease states, including coronary heart disease and cancer, in which methodologic issues and interpretation of findings are highlighted. Students completing this course will understand the basic principles of nutritional epidemiology and will be able to apply them in reading the literature and participating in nutrition research projects. This is a small, intermediate-level epidemiology class, which combines lectures with in-class discussion of classic and cutting-edge research articles. In addition, one-on-one meetings are set up with students throughout the semester to provide focused attention and facilitate mastery of the material. (*Quatromoni, 4 cr, Summer*)

Or

SAR HS 776 Nutritional Epidemiology (Sargent College)

This course examines epidemiologic methods for investigating the role of diet in long-term health. Students learn to critically review the epidemiologic evidence relating diet, anthropometry, and physical activity to heart disease, cancer, and other chronic health conditions including obesity and diabetes. The methodological issues covered include epidemiologic study design; dietary and nutritional status assessment; issues of bias, confounding, effect modification and measurement error; and interpretation of research findings including an understanding of statistical modeling. Students participate weekly in critical reviews

of published research. Students completing this course will understand the principles of epidemiology and will be able to apply them as they read the scientific literature and participate in nutrition-related research. (*Quatromoni, 4 cr, Fall*)

ELECTIVES:

Electives are selected in consultation with your advisor, depending on your interests and goals. See course descriptions for more information.

Suggested Electives according to field -- among others consider:

GMS PH 730 - Human Physiology A Cellular and organ physiology. Lectures and discussions examine the function of nerves, muscles, blood and the cardiovascular and digestive systems. Emphasis is placed on the regulation of organ function and on integrative aspects of human physiology. (*4 cr, Fall*) **[note: this is a good course for premeds – and this first semester is a prerequisite for the second half (Physiology B)**

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For more advanced students (upon consultation with their advisor):

GMS MM 701 Genetics & Epidemiology of Disease (*2 cr*)

GMS MM 703 Cancer Biology & Genetics (*2 cr*)

GMS MM 707 Organ System Diseases (*2 cr*)

GMS MS 621 Bench to Bedside – Translating Biomedical Innovation from the Laboratory to the Marketplace (*4 cr*)

Clinical Nutrition Research:

GMS CI 675 Designing Clinical Research Studies (*4 cr*)

GMS CI 640 Regulatory & Compliance Issues (*4 cr*)

GMS CI 671 Intermediate Biostatistics with Computer (*4 cr*)

HOW TO REGISTER for GMS courses:

Returning students should go to the GMS website and the student link to register for courses. Each semester you will be provided with a webreg number. We register first term students for a default program, and add/drops can be on 'on paper' during orientation.

To Register for Courses at SPH:

SPH Course Registration.

Go <http://sph.bu.edu/Registrar-Office/forms/menu-id-50218.html>

Choose "add/drop" form"

Complete the Form and get Dr. Fried or Dr. Moore's signature

Fax the Form to the SPH Registrar's office at 617-638-5060

BU GMS GENERAL POLICIES:

Academic standing: Each semester, students will submit a report on their progress to their Program Advisor who will forward it to the Director (and to the Curriculum Committee as needed). Students with a GPA below 3.0 (B) will be placed on academic probation. Grades below B- (C+ or below) will not count as graduate credits toward the M.A. degree.

Social Contract between Mentor and Mentee: Your relationship with your research advisor is an important one. GMS has an official policy on fair expectations of graduate students (<http://www.bumc.bu.edu/gms/gateway/students/phd/fair-expectations-for-graduate-students/>). Should you have any questions about this policy or your relationship with your research advisor, you may bring them to the attention of the Program Director or Co-Director.

Safety, Sexual Misconduct: The Boston University Public Safety Department at the medical campus provides services and support to all students at the Schools of Medicine (of which GMS is a part), Dental Medicine, and Public Health, as well as to the Boston Medical Center. In the event of an emergency, call the Boston University Medical Campus Command and Control Center at 617-414-4444. If you are calling from a phone inside of the university, just dial 4-4444.

B.U. has a campus-wide emergency alert system. In the event that an emergency exists anywhere on campus or in the vicinity of any B.U. campus, you will be notified by cell phone, text messaging, and/or email.

B.U. is governed by federal policies on sexual discrimination and misconduct. These policies are referred to as Title IX amendments to the 1972 Civil Rights Law. Please see the following page to see this policy and for answers to any related questions you might have: <http://www.bu.edu/safety/sexual-misconduct/title-ix-bu-policies/>

SEMINARS

Nutrition Seminar: Seminars are an important component of training at all stages of a scientific career. Students *are expected* to participate in the weekly Nutrition Seminar, currently scheduled on Thursdays at noon as well as other seminars of interest -- .eg.. those attended by their research groups and special seminars by announcements..

Other BU Medical School and Boston Medical Center Seminars and Meetings. A large number of seminars and meetings are offered on the medical campus. All students are strongly encouraged to attend additional seminars in their areas of study on campus. Students are expected to attend the annual Evans Days events (held each fall) and the Boston Nutrition and Obesity Center (BNORC) annual program (see bnorc.org).. Advanced students are encouraged to submit a poster on their research work for presentation at one of these two meetings.

TIME TO COMPLETION OF THE DEGREE: If you enter with Biochemistry, then it is possible to finish in one calendar year (Fall, Spring, Summer I and Summer II (4 semesters). However, depending on your goals, it may be to your benefit to take 1.5 to 2 years to finish your degree. You should make a plan and discuss with your advisor. Of course you can change your plan as your progress.

USEFUL LINKS

GMS: <http://www.bumc.bu.edu/gms/>

Nutrition & Metabolism Website: <http://www.bumc.bu.edu/gms/nutrition-metabolism/>

BU GMS forms: <http://www.bumc.bu.edu/gms/gateway/students/phd-mdphd/forms/>

Graduate Medical Sciences Student Organization (GMSSO) (note our representative is Justin Buendia (jbuen@bu.edu)):

Department of Medicine: <http://www.bumc.bu.edu/medicine/>

Boston University Medical Campus: <http://www.bumc.bu.edu/>
BU Main Site: <http://www.bu.edu/>
BU Student Link:
[https://www.bu.edu/link/bin/uiscgi_studentlink.pl/1389729333?applpath=menu.pl
&NewMenu=Home](https://www.bu.edu/link/bin/uiscgi_studentlink.pl/1389729333?applpath=menu.pl&NewMenu=Home)
GMS Student Organization: <http://www.bumc.bu.edu/gms/student-life/gmsso/>
Pub Med: <http://www.ncbi.nlm.nih.gov/sites/entrez/>
Core Facilities and other Research Resources:
<http://www.bumc.bu.edu/ResearchIndex.html>

E-mail: Follow instructions provided by GMS.

Graduate Student Bulletin Boards: Information of interest and relevance to graduate students is posted on the bulletin boards located outside the GMS offices.

Computers: The Medical School Computer Lab is located in the library on the 12th floor of the L building.

Fitness: Students are able to use the Recreation Center on the Charles River Campus (<http://fitrec.bu.edu/>) or purchase a membership to the South End Fitness Center (<http://www.southendfitness.org>) located near the Medical Campus

Healthcare: Students are enrolled in BU's Aetna Medical Insurance. More information can be found at Student Health Services (<http://www.bu.edu/shs>) and on the GMS website.

Housing: It is recommended that students visit the Housing Resources website for to find housing options in Boston:
<http://www.bumc.bu.edu/gms/gateway/welcome-accepted-students/accepted-student-housing-information/>

BU RESEARCH REQUIREMENTS

As a student you must complete the following training:

Lab Safety Certification (course required yearly for ALL students)
<http://www.bu.edu/orctraining/ehs/research-safety-training/>

Responsible Conduct in Research (RCR) (required for ALL students
<http://www.bumc.bu.edu/gms/2011/01/14/registration-for-program-in-responsible-conduct/>

Radiation Safety Certification (course or refresher required yearly if working with radiation) <http://www.bu.edu/orctraining/>

Animal Handling Training and Certification (required for students working with animals):
<http://www.bu.edu/orctraining/animal/>

Human Subject Research Training and Certification (required if working with human subjects, tissues or cells):
<http://www.bumc.bu.edu/ocr/certification/>

Master of Science in Nutrition & Metabolism Sample Curricula

For the Master of Arts degree, you need a minimum of 32 credits, including 4 credits of research.

Sample Curriculum 1: Basic Nutrition Science concentration

Course number	Course Name	Credits
Fall Semester		
GMS NU 755	Molecular, Biochemical and Physiologic Bases of Nutrition I: Energy Balance and Micronutrients	4
GMS NU 804 and/or	NU 804: Directed study: Experimental Design and Biostatistics for Biomedical Sciences	2 4
GMS BI 751 Or BI 752	Biochemistry and Cell Biology (not required if you have passed an undergraduate biochemistry course with a grade of B or better – you must petition the curriculum committee)	6 4
	ELECTIVES in Physiology, MAMS curriculum, Clinical Research etc	3-4
Spring^s		
GMS NU 756	Molecular, Biochemical and Physiologic Bases of Nutrition: Macronutrients	4
GMS NU 620	Clinical Nutrition Research	3
	Elective	3 or 4 4
GMS NU 700	Nutrition & Metabolism Seminar	2
Summer I		
GMS NU 901	Research / Master's thesis	2
Summer II		
GMS NU 902	Research / Master's thesis	2

Sample Curriculum 2: Clinical Translational or Nutritional Epidemiology concentrations

Course number	Course name	Credits
Fall		
GMS NU 755	Molecular, Biochemical, and Physiological Bases of Nutrition: Energy, Vitamins and Minerals*	4
CI670	Biostatistics with Computer or other elective	4
NU 804	Directed Study – (Fall 2014 – Experimental Design and Biostatistics for Biomedical Sciences	2 or 3
GMS BI 751 or 752	Biochemistry and Cell Biology (not required if undergrad course passed with a B- or better – you must petition the curriculum committee)	4 or 6
Spring[§]		
GMS NU 756	Molecular, Biochemical, and Physiological Bases of Nutrition: Metabolism	4
GMS NU 620	Clinical Nutrition Research	3
GMS NU 700	Nutrition & Metabolism Seminar	2
	ELECTIVE or Research Credits (NU902)	
Summer I		
GMS NU 901	Research / Master's thesis	2
Summer II		
GMS NU 902	Research / Master's thesis	2

* Biochemistry prerequisite and permission of the instructor required.

† The biochemistry requirement may be waived if equivalent undergraduate or graduate coursework was taken with a grade of B or better. If you have not completed the biochemistry requirement in your undergraduate coursework, it will be difficult to finish this M.A. in one calendar year. For those needing to complete biochemistry:

Students without prior biochemistry fulfilling this requirement with BI 751 can take NU 756 in the Spring and GMS NU 755 the following fall.

§ Lab /research experiences should start in the Spring, but may start earlier