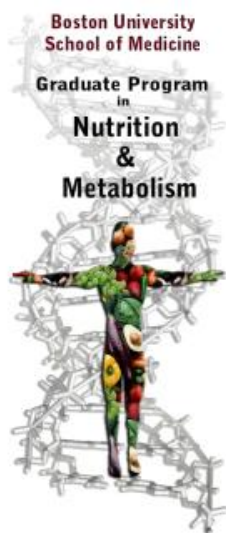

GUIDE FOR MASTER'S STUDENTS
GRADUATE PROGRAM
In
NUTRITION and METABOLISM

Boston University School of Medicine
Division of Graduate Medical Sciences



Revised July 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.*

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 Building X, Room-815.

Lynn L. Moore, Co-Director, PhD, Associate Professor, Dept. of Medicine, Section of Preventative Medicine & Epidemiology. She can be contacted at llmoore@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

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. Students assist with the admissions process by meeting with candidates over lunch and providing tours.

Mr. Di (Eddy) Gao (dqao@bu.edu) is our administrator in charge of admissions. His office is at 801 Massachusetts Ave., Suite 470.

Curriculum Committee:

This Committee oversees the first and second year curricula of the N & M students, including approving credits 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 bi-yearly faculty meetings, and make recommendations for curriculum changes.

This Committee monitors the progress of each student before and after the satisfactory completion of coursework and 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.

Executive Committee

This committee includes the Director, Co-Director, Chair of the Dept of Medicine, and one other individual. The committee is charged with overall strategic planning and oversight of the program.

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 advisor, and any academic or related issues that may arise.

Thesis Advisors:

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

III. COURSE OF STUDY

Overview of Degree requirements for the MA degree:

To earn the M.A., 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 a faculty member that reports original research conducted.

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. There are no page requirements, but the usual format is: Introduction (3-5 pages), Materials and Methods (3-5 pages), Results (4-6 pages), and Discussion (4-6 pages), for a total of 20 to 25 pages (double spaced). You are expected to start research for the thesis in the Spring semester at the latest.

The thesis topic is agreed upon with your advisor. We recommend that a brief, 1 page proposal should be written, signed by you and your advisor and provided to the Curriculum Committee.

Master's Thesis Committee: You and your advisor will agree upon two readers for your thesis, but additional members can be added to your committee as needed for special expertise. Readers can provide you with 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 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 should also 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 alteration in nutritional status (e.g. starvation, obesity) on a whole body and tissue-specific basis. Mechanism regulating macronutrient metabolism in response to stresses such as exercise and aging and disease. 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 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*)

EP 758 Nutritional Epidemiology - (SPH) (check bulletin for when offered)

The purpose of this course is to introduce students to the discipline of nutritional epidemiology. In the class, we will focus on methodological issues relating to design, dietary assessment, and data analysis of studies on diet and disease. We will also review some of the literature relating nutrition to certain disease states, including coronary heart disease and cancer, in which we highlight methodological issues and interpretation of findings in nutritional epidemiologic research. 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.

Prerequisite : The biostatistics and epidemiology MPH core requirements.

(Credits: 4 cr. Instructor: Quatromoni)

GMS NU 804 Advanced Methods in Medical Nutrition Research (course name and number will change in fall 2014)

This course is designed to develop advanced analytical and interpretive skills by exploring selected statistical topics (ANOVA, ANCOVA, multiple linear, logistic, and proportional hazards regression and providing directed experiences in statistical analysis of large nutrition research data sets (NHANES, etc.). *(Moore, 2 cr)*

BIOCHEMISTRY:

GMS BI 751 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, 1st sem - this course is not usually taken by PhD students)*

GMS BI 755/756 Biochemistry A, B

Prereq: organic chemistry or equivalent, and consent of instructor. This two-semester course provides the biochemical foundation for advanced studies in basic and clinical sciences. Topics presented in the first semester include the structure and function of macromolecules, the mechanisms of enzyme action, the metabolism of carbohydrates and lipids, as well as bioenergetics. The second semester continues with the metabolism of lipids, amino acids and nucleotides, the control of metabolic processes, the function of hormones, biochemical genetics, and transcriptional and translational events. *Kandror, Polgar 4 cr, 1st and 2nd sem.*

STATISTICS (*minimum 2 cr required*):**BS 701 Elementary Biostatistics**

This course meets the biostatistics MPH core requirement and is for students who have not had prior experience with statistics or biostatistics. Topics include the collection, classification, and presentation of descriptive data; the rationale of estimation and hypothesis testing; correlation and regression analysis; analysis of variance; and analysis of contingency tables. Special attention is directed to the ability to recognize and interpret statistical procedures in articles from the current literature. Students will also learn statistical computing techniques using Microsoft Excel. Students who take this course cannot take BS703 for degree credit. This course or BS703 is required for all MPH students. Students may not take BS701 and BS703 for degree credit.

BS 703 Biostatistics

This is the more advanced MPH biostatistics core course. This course is recommended for students concentrating in biostatistics, environmental health, or epidemiology, and for students with previous exposure to statistical methods or an interest in public health research methods. Topics include confidence intervals and hypothesis testing; sample size and power considerations; analysis of variance and multiple comparisons; correlation and regression; multiple regression and statistical control of confounding; logistic regression; and survival analysis. This course gives students the skills to perform, present, and interpret basic statistical analyses, using the R statistical computing package. For the more advanced topics, the focus is on interpretative skills and critically reading the literature. This course satisfies the core biostatistics requirement for MPH students. Biostatistics concentrators should take this course, though the course does not count towards the 16 required concentration credits. Students who take BS703 cannot take BS701 for degree credit. Beginning in Fall 2012, BS703 will no longer be taught and BS704 will take the place of BS701 and BS703 in the curriculum for all degree programs.

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*)

Or

GMS NU 804 Advanced Methods in Medical Nutrition Research (*name and course number will change in fall 2014*)

Experimental design and statistics in basic and translational nutrition research (title being changed officially).

Note: Equivalent courses are acceptable with permission of the curriculum committee, and additional more advanced courses are suggested for those pursuing careers in Epidemiological or Clinical Nutrition Research.

EPIDEMIOLOGY:

For students focusing on clinical/translational or epidemiologic research:

SPH 713 or NU 804 (name and number of this course will change in fall 2014) meets this requirement.

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 required for the PhD Focus in Nutritional Epidemiology is also 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. 4 credits, 2nd semester. (*Quatromoni, 4 cr, Fall*)

ELECTIVES:

Electives are selected in consultation with your advisor, depending on your interests and goals.

Suggested Electives according to field -- among others consider:

Basic Nutrition Science:

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 PH 730 Human Physiology A	(4 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)

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

To Register for Course at GMS:

Go to <http://www.bumc.bu.edu/gms/gateway/students/registration/ma-ms-fall-registration>

Comment [GD1]: This link is for MA & MS Spring 2014 Registration only

Follow instructions for Web Registration

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’s signature

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

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. 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.

SEMINARS

Nutrition Seminar: Seminars are an important component of training at all stages of a scientific career. Students will also participate in the weekly Nutrition Seminar, currently scheduled on Thursdays at noon.

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 (retreat). 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.

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):
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
GMS Student Organization: <http://www.bumc.bu.edu/gms/student-life/gmssso/>
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 L12.

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/>

Comment [GD2] : Typo or somethingelse?

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 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 Arts 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 GMS CI 670	Advanced Methods in Medical Nutrition Research	2
	Biostatistics with Computer	4
GMS BI 751 or GMS BI 755/756	Biochemistry and Cell Biology	6
	Biochemistry A/B	4
SPH EP 713 or GMS CI 675	Introduction to Epidemiology	3
	Designing Clinical Research Studies	4
Spring^s		
GMS NU 756	Molecular, Biochemical and Physiologic Bases of Nutrition: Macronutrients	4
GMS NU 620	Clinical Nutrition Research	3
SAR HS 776 or SPH EP 758	Nutritional Epidemiology[†]	4
	Nutritional Epidemiology	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
SPH BS 701 or SPH BS 703 or GMS CI 670 or GMS MS 700	Elementary Biostatistics	2
	Biostatistics	2
	Biostatistics with Computer	4
	Biostatistics	2
NU 804	Advanced Methods in Nutrition and Metabolism	2
GMS BI 751	Biochemistry and Cell Biology (not required if undergrad course passed with a B- or better)	6

	Spring^s	
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
	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:

(a) Students focusing on basic nutrition research and further graduate work in the biological aspects of nutrition could consider taking BI 621 (Biochemistry I: Introductory Biochemistry) and/or BI 622 (Biochemistry II: Cell Metabolism) on the Charles River Campus, or with special permission, the "Foundations in Biomedical Sciences (FiBS) courses.

www.bumc.bu.edu/gms/global-pages/fibs-foundations-in-biomedical-sciences/foundations-in-biomedical-sciences/

(b) Students concentrating on clinical or epidemiologic research usually take GMS BI 751 in the fall

(c) Students may take GMS BI 756 (second part of biochemistry) at the same time as GMS NU 756 in the spring.

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

‡ Students in the Basic Science concentration are required to complete an Introductory Epidemiology or research methods course OR Nutritional Epidemiology course taught at BU's Sargent College (SAR HS 776).

If Introduction to Epidemiology is taken, Nutritional epidemiology (SPH EP 758) may be taken in the Fall (but is not required).

§ Lab /research experiences should start in the Spring, but may start earlier (no credit or sign up for GMS NU 804 if you need course credits and wish to do a directed study).