Master of Public Health/Master of Science in Nutrition Dual Degree Proposal

(Plan B, non-thesis requiring)

Document of December 8, 2014; Revised February 2, 2015

This is a dual degree program that is offered jointly by the Departments of Epidemiology and Biostatistics, and Nutrition. The core Master Degree courses include a mixture of those from nutrition, biochemistry and public health.

1. Background and Justification

The World Health Organization, (WHO), identifies diet and nutrition as a lifestyle factor critical for maintenance of health and well-being, as well as a factor influencing risk of chronic disease. Cardiovascular disease, diabetes, cancer and obesity are examples of chronic diseases significantly related to diet and nutrition. Obesity is one of the most common conditions and is growing to epidemic proportions. The two most common associated co-morbidities of obesity, type 2 diabetes and hypertension, are highly prevalent health risks and are among the principal causes of death in the general population. Additionally, in third world countries, malnutrition is a very common cause of infection or death, especially in young children. Accordingly, knowledge of the basic elements of good nutrition and the biochemical pathways associated with the metabolism of protein, fat and carbohydrate offers important contributions to mitigate these health problems. The proposed dual degree program will provide the student with a core understanding of the mechanics of metabolism combined with advanced courses in public health and nutrition. This combined approach will yield a highly qualified and competitive public health practitioner trained to develop evidence based policy, programs, strategies and advocacy to address these health risks and problems.

The trained graduate could be employed in a wide variety of settings, including (but not limited to) local, state, national, or global public policy, governmental public health, hospital outreach, community-based health non-profit organizations, health organizations, research projects; or the Food and Drug Administration. Additionally, these graduates could serve as health emissaries to foreign countries regarding nutrition, sufficient food supply, sanitary environment, food safety, oral rehydration, or the advisability of food supplements. Recent evidence demonstrates that obesity has now passed tobacco as the top driver of health care cost in the US at $190 billion per year. At a time of high health care cost, improved preventive care represents a best hope to decrease the healthcare cost of obesity and its related chronic diseases while improving quality of life before the complications of poor nutrition occur.

2. Administration

Program administration and governance will be managed jointly by program liaisons identified from Public Health, Nutrition and Biochemistry. Liaisons will meet at least once per semester to assure effective program management. Each liaison will also work within management structure of their own program in order to meet necessary liaison responsibilities. Program leadership has substantial experience with dual degree program administration, with 9 successfully managed dual degrees offered by the MPH program. Dual degree students make up 40 to 45% of the MPH student body. Dual degree management is bolstered by the MPH Management Team which meets on a weekly basis to discuss administrative issues and review student progress. Retreats are conducted 4 times yearly to discuss "big issues" that require input from the MPH executive committee. The Management Team includes representatives from the Student Public Health Assembly who have to opportunity to bring student issues and contribute to program decision-making. These students are dismissed during discussion of individual student progress.

- Master of Public Health liaison: Scott Frank, Associate Professor of Epidemiology and Biostatistics
- Nutrition Department liaison: Hope Barkoukis, Associate Professor of Nutrition

Responsibilities of the liaisons include:

- Program policy decision-making: Liaisons will make policy recommendations through appropriate structure in each department.
- First level student advising: Meeting with all MPH/Nutrition dual degree students to assure appropriate networking of the student into the program.
- Assign faculty advisors: Public Health and Nutrition will each identify a primary faculty advisor for MPH/Nutrition dual degree students, though if a better match is apparent the liaison may assign a different advisor.
- Systematic review of student progress: This task will be addressed independently by each program through existing mechanisms and further discussed at liaison meetings.
- Oversee recruitment and admission of MPH/Nutrition dual degree students.
- Participate in a yearly meeting of MPH dual degree liaisons from all dual degree programs to compare program progress and discuss dual degree issues that cross disciplinary boundaries.
- Oversee routine and special communications with MPH/Nutrition dual degree students, including delegation of these communications as appropriate.

3. Program Structure

If one were to acquire the MPH and MS degrees independently, it would require the completion of 42 hours for the MPH program and 30 hours for the MS in Nutrition program (a total of 72 credit hours). The 42 credit hour and 30 credit hour numbers are for the independent programs as accredited through the Ohio Board of Regents.

In the dual degree program, cross counting allows for a reduction in the total number of class hours to 58 credit hours for both degrees as described below (33 credit hours in MPHP and 25 credit hours in BIOC/NTRN).

The MPH/Nutrition dual degree is envisioned with students able to apply for either degree, then later join the other; or apply directly for the joint degree. Both the MPH and MS programs confer degrees through the School of Graduate Studies and as such are subject to Graduate Studies rules and procedures. Both programs are housed in the School of Medicine.

4. Dual Degree Curriculum: Sample Program of Study

Year 1 – Emphasis on Biochemistry and Public Health					
Fall Course #	**Fall Course Title**	**Cr Hrs/ Degree**	**Spring Course #**	**Spring Course Title**	**Cr Hrs/ Degree**
BIOC 407	Introduction to Biochemistry*	4/MS	BIOC 408	Molecular Biology*	4/MS
MPHP 406	History and Philosophy of Public Health**	3/MPH	MPHP 429	Introduction to Environmental Health**	3/MPH
MPHP 483	Intro to Epidemiology for Public Health**	3/MPH & MS	MPHP 405	Statistical Methods in Public Health**	3/MPH
MPHP 403	Public Health Research & Evaluation Methods**	3/MPH	MPHP 439	Public Health Management & Policy**	3/MPH
Total Fall MS Credits		4+3	Total Spring MS Credits		4
Total Fall MPH Credits		9	Total Spring MPH Credits		9
Year 1 MS Credit Hour Total/Dual Total					8/11
Year 1 MPH Credit Hour Total/Dual Total					18/18
Year 1 Dual Degree Credit Hour Total/Dual Total					26/29

* MS Required. **MPHP Required. Note: MS degree components are shaded in grey.

Year 2 – Emphasis on Nutrition and Public Health					
Fall Course #	**Fall Course Title**	**Cr Hrs/ Degree**	**Spring Course #**	**Spring Course Title**	**Cr Hrs/ Degree**
NTRN 433	Advanced Human Nutrition I*	4/MS	NTRN 434	Advanced Human Nutrition II*	3/MS
MPHP 411	Introduction to Health Behavior**	3/MPH & MS	MPHP	Public Health Major Elective	3/MPH
NTRN	Nutrition Elective	3/MS & MPH	MPHP 650	Public Health Practicum**	3/MPH
Total Fall MS Credits		4+3	Total Spring MS Credits		3
Total Fall MPH Credits		3+3	Total Spring MPH Credits		6
Year 2 MS Credit Hour Total/Dual Total					7/10
Year 2 MPH Credit Hour Total/Dual Total					9/12
Year 2 Dual Degree Credit Hour Total/Dual Total					16/22

* MS Required. **MPHP Required. Note: MS degree components are shaded in grey.

Year 3 – Emphasis on Nutrition and Public Health					
Fall Course #	**Fall Course Title**	**Cr Hrs/ Degree**	**Spring Course #**	**Spring Course Title**	**Cr Hrs/ Degree**
NTRN 452	Nutritional Biochemistry and Metabolism*	3/MS	NTRN	Nutrition Elective	3/MS & MPH
MPHP 652	Public Health Capstone**	3/MPH	MPHP 652	Public Health Capstone**	3/MPH
NTRN	Nutrition Elective	3/MS & MPH	EXAM 600	MS Qualifying Exam*	1/MS
Total Fall MS Credits		6	Total Spring MS Credits		4
Total Fall MPH Credits		3+3	Total Spring MPH Credits		3+3
Year 3 MS Credit Hour Total/Dual Total					10/10
Year 3 MPH Credit Hour Total/Dual Total					6/12
Year 3 Dual Degree Credit Hour Total/Dual Total					16/22
Grand MS Credit Hour Total/Dual Total					25/31
Grand MPH Credit Hour Total/Dual Total					33/42
Grand Dual Degree Credit Hour Total/Dual Total					58/73

* MS Required. **MPHP Required. Note: MS degree components are shaded in grey.

MPH Dual Degree = 33 credit hours (standard program 42 credit hours)
BIOC/NTRN Dual Degree = 25 credit hours (standard program 30 credit hours)
Total Dual Degree = 58 credit hours

The standard MPH program consists of 21 hours of core required material, 9 hours of major, 3 hours of elective, and 9 hours of culminating experience (3 credits of practicum and 6 hours of capstone). In the MPH/MS in Nutrition dual degree program, the 9 hours of major credit will consist of one MPH major required course (see below) and 2 approved Nutrition courses pertinent to that major. An additional approved Nutrition course may be taken in fulfillment of the MPH Elective course. For the purposes of completing the M.S. in Nutrition, the 25 hours of Nutrition and Biochemistry will be complimented with 6 hours of MPHP courses. Default courses counting toward the MS in Nutrition will be MPHP 483 (Public Health Epidemiology) and MPH 411 (Health Behavior).

MPH Major Required Courses:

- Health Promotion and Disease Prevention:
    - MPHP 433 Community Intervention and Program Evaluation
- Health Care Policy and Administration:
    - MPHP 468 Continual Improvement of Health Care
- Global Health (choose one):
    - INTH 401 Fundamentals of Global Health
    - MPHP 484 Global Health Epidemiology
    - MPHP 494 Infectious Disease epidemiology
- Population Health Research
    - Methods course, individually determined with Population Health Research track leader

The sample program of study above is intended as a template which will vary based on student needs. While the basic coursework will remain consistent, electives will differ and the sequence or number of courses taken during different years of the program may vary. Students have the option of taking summer courses, which could change the number of credit hours per semester or the duration of their program of study. All students will meet with program liaisons from Public Health and Nutrition upon program entry and with assigned faculty advisors throughout the duration of the program to individualize their program of study and assure compliance with all program requirements. If a student elects to discontinue the dual degree program and complete only one of the degrees, they will be expected to meet full credit hour requirements of the remaining program.

5. Admissions

Target enrollment in the program is six or more students, achieved by admission of at least two students annually. Students wishing to enroll in the dual degree program apply and are admitted into each program separately. While admissions committees for each program will communicate with each other regarding applicants, each committee will decide independently about the suitability of the applicant to their program. Admissions for both programs comply with policies set by the School of Graduate Studies. Applicants should provide the program with a national exam score (such as the GRE, MCAT, LSAT, GMAT, etc) and a TOEFL score if the applicant is applying from a foreign country where English is not the

native language. In addition, in order to be prepared to take graduate courses in the biological sciences, the applicant must have taken introductory biology, general chemistry, and organic chemistry. Additional courses such as introductory physics, calculus, statistics and genetics would strengthen the student's application although these would not be required for entry into the dual degree program. The standard national exam score to be reported will be the GRE, but as noted above, others may substitute. Once students have been admitted, they will consult with their MPH Program Advisor to determine their appropriate course of MPH study and with the Department of Nutrition Advisor to determine their appropriate program of MS study. Advisor meetings will continue at least once per semester.

6. Tuition Revenue Mechanics:

For courses taught by Nutrition, Epidemiology and Biostatistics, or Biochemistry (prefixes: NTRN, BIOC, MPHP, EPBI), the tuition return will go to the teaching department. For courses taught by other departments, usual medical school rules for the tuition return should apply, with the "home" department being Nutrition if the course is being used for the MS in Nutrition, and Epidemiology and Biostatistics if the course is being used for the MPH.

No additional costs are anticipated in the initiation or maintenance of the MPH/Nutrition dual degree program.

7. Approval Signatures

Vice Chair for Education, Department of Epidemiology and Biostatistics
Dr. Mendel Singer

Interim Chair, Department of Nutrition
Dr. Hope Barkoukis

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Chair, Department of Biochemistry
Dr. Michael A. Weiss

Dean, School of Medicine
Dr. Pamela A. Davis

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Dean, School of Graduate Studies
Dr. Charles Rozek

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8. Student Activities

The MPH/Nutrition program liaisons or their designee will regularly contact students in the program by email with information about activities and to verify proper progress. At the conclusion of year one, the faculty advisors (from MPH and Nutrition) will notify students of their progress. During the subsequent years, yearly student evaluations will be completed once by each of the respective programs.

Students are encouraged to participate in regular Departmental activities as their schedule will allow. Under the direction of the Graduate Program Directors, all MPH/MS students enrolled in the dual degree program will meet twice a year in a colloquium retreat (approximately one-half day in length). The purposes of the retreat are (1) to ensure the programs are meeting the expectations of the students and the faculty, (2) to capture the benefits of the interdisciplinary experience, (3) to socialize the dual degree students as a group, instead of small groups of isolated students, and (4) to explore the intellectual and professional challenges of doing interdisciplinary work. Students from other dual degree programs may also be included.

In addition, at the beginning of their first semester the Graduate Program Advisors will meet with each dual degree student to review their schedule and to explore any other issues on which they need guidance and advice. All new students will be partnered with an experienced student to address questions the students may have about the program and life as a graduate student at Case. These students will initially be drawn from the ranks of existing MS, MPH, or PhD. students. Once the program is established student guides will be partnered with advanced MPH/MS students. A get-acquainted welcoming event will be organized in the fall to facilitate this process.

The MPH Capstone requirement and the MS EXAM 600 requirement may be completed jointly by the dual degree student. Each student must form a Capstone Committee that includes at least 3 members, with at least one from the MPH program and one from Nutrition. Capstone Committee membership should be driven by the student's scholarly and research topic interest. Detailed criteria and guidelines for the completion of this project are available. To satisfy requirements for both programs, the Capstone must include a focus on both nutrition and public health; and must be approved by committee members from both programs. The

product of this Capstone project may be framed as an essay, a report, or as a manuscript suitable for peer-reviewed submission. In addition to the written product, the student is required to conduct a formal oral presentation at the MPH conducted Public Health Innovations conference offered yearly in the spring and fall. Capstone evaluation includes assessment of the essay, the oral presentation, and completion of Capstone competencies by each Capstone Committee member.

Other appropriate activities for the MPH/MS students may include attending the weekly Departmental Seminar and Student Seminars, as well as annual named lectureships, participating in annual retreats, and one or more journal clubs.

9. Advantages of the Joint Degree Program

The key advantage the MPH/MS program will be the integration of the two disciplines *during* the time the students receive their training, thus allowing the students to develop a unique focus on their studies in each of the two disciplines. Creating a nutrition track (major) within the MPH program was considered as an alternative to a dual degree, but rejected because of limitations on rigor and depth possible in a 42 credit hour nutrition track compared to the 58 credit hour dual degree. Further, this comprehensive, concurrent focus encourages systems thinking and may compel students to look at each discipline through a different lens. One of the substantial strengths of the CWRU MPH program involves the number and diversity of dual degree programs offered. This encourages a true multidisciplinary approach, with classmates from 9 different MPH dual degree programs (medicine, dental medicine, anthropology, law, business, nursing, social work, bioethics, and integrated undergraduate) encouraging dialogue and broadening of perspective and worldview. In addition, the usual Master of Science in Nutrition and MPH programs are each two year programs, but the students in the dual degree program will be able to complete the program requirements in just 36 months (about 6 semesters).

It should be noted that there is the potential for confusion regarding an existing MS program titled the Public Health Nutrition Dietetic Internship Program (PHNDIP), though often referred to as “Public Health Nutrition”. This proposed dual degree program differs starkly from the PHNDIP, also housed within the Nutrition Department. The PHNDIP is an accredited dietetic internship program consisting of 1500 hours of community-based supervised practice while concurrently completing the MS degree coursework. This internship program is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) and is the longest running program of its kind in the US, started in 1941. Students cannot apply for direct admission to the PHNDIP program, but instead must participate in a national online match program after having completed the necessary prerequisite science and nutrition courses. Students admitted to the dual degree program will not be eligible for the PHNDIP because they would likely lack the mandatory prerequisite courses necessary for participation eligibility in the national online application process. Specifically, an additional 17 credit hours in science courses

and 25 additional credit hours in nutrition courses would be necessary for PHNDIP application eligibility

10. MPH/MS in Nutrition programs in the US (results of a Google search) – As noted below, there appear to be very few dual degree MPH/MS in Nutrition programs in the United States. While there are some programs that have a concentration in their public health program in nutrition (University of Minnesota, University of Massachusetts, City University of New York, Hunter College, University of Washington, University of Michigan to name a few) the joint MPH/MS degree is indeed rare, as shown in the list below. The paucity of programs does not reflect the importance of this disciplinary combination or student interest in the dual degree, but rather resources necessary to offer this complex and comprehensive program. We are fortunate to have the resources and leadership vision to join this list of outstanding universities.

- Tufts University (MPH/MS Nutrition)
- University of Tennessee (MPH/MS Nutrition)
- Benedictine University (MPH/MS Nutrition)
- Saint Louis University (MPH/MS Nutrition)
- Stony Brook University (MPH/MS Nutrition)
- Johns Hopkins University (MSPH/Registered Dietitian)
- University of North Carolina (MPH/Registered Dietitian)

Course descriptions for Biochemistry and Nutrition courses anticipated to be taken as part of the MPH/MS program

Note: All listed courses have been reviewed and are currently active.

BIOC 407. Introduction to Biochemistry: From Molecules To Medical Science. 4 credits.
Overview of the macromolecules and small molecules key to all living systems. Topics include: protein structure and function; enzyme mechanisms, kinetics and regulation; membrane structure and function; bioenergetics; hormone action; intermediary metabolism, including pathways and regulation of carbohydrate, lipid, amino acid, and nucleotide biosynthesis and breakdown. The material is presented to build links to human biology and human disease. One semester of biology is recommended. Offered as BIOC 307, BIOC 407, and BIOL 407. Prereq: CHEM 223 or CHEM 224.

BIOC 408. Molecular Biology. 4 credits.
An examination of the flow of genetic information from DNA to RNA to protein. Topics include: nucleic acid structure; mechanisms and control of DNA, RNA, and protein biosynthesis; recombinant DNA; and mRNA processing and modification. Where possible, eukaryotic and prokaryotic systems are compared. Special topics include yeast as a model organism, molecular biology of cancer, and molecular biology of the cell cycle. Current literature is discussed briefly as an introduction to techniques of genetic engineering. Recommended preparation for BIOC 408 and BIOL 408: BIOC 307 or BIOL 214. Offered as BIOC 308, BIOL 308, BIOC 408, and BIOL 408.

BIOC 412. Proteins and Enzymes. 3 credits.
Aspects of protein and nucleic acid function and interactions are discussed, including binding properties, protein-nucleic acid interactions, kinetics and mechanism of proteins and enzymes, and macromolecular machines. Recommended Preparation: CHEM 301. Offered as BIOC 312 and BIOC 412.

BIOC 420. Current Topics in Cancer. 3 credits.
The concept of cancer hallmarks has provided a useful guiding principle in our understanding of the complexity of cancer. The hallmarks include sustaining proliferative signaling, evading growth suppressors, enabling replicative immortality, activating invasion and metastasis, inducing angiogenesis, resisting cell death, deregulating cellular energetics, avoiding immune destruction, tumor-promoting inflammation, and genome instability and mutation. The objectives of this course are to (1) examine the principles of some of these hallmarks, and (2) explore potential therapies developed based on these hallmarks of cancer. This is a student-driven and discussion-based graduate course. Students should have had some background on the related subjects and have read scientific papers in their prior coursework. Students will be called on to present and discuss experimental design, data and conclusions from assigned publications. There will be no exams or comprehensive papers but students will submit a one-page critique (strengths and weaknesses) of one of the assigned papers prior to each class meeting. The course will end with a full-day student-run symposium on topics to be decided jointly by students and the course director. Grades will be based on class participation, written critiques, and symposium presentations. Offered as BIOC 420, MBIO 420, MVIR 420, PATH 422, and PHRM 420. Prereq: CBIO 453 and CBIO 455.

BIOC 434. Structural Biology. 3 credits.
Introduces basic chemical properties of proteins and discusses the physical forces that determine protein structure. Topics include: the elucidation of protein structure by NMR and by X-ray crystallographic methods; the acquisition of protein structures from data bases; and simple modeling experiments based on protein structures. Offered as BIOC 334, BIOL 334, BIOC 434, and BIOL 434.

BIOC 452. Nutritional Biochemistry and Metabolism. 3 credits.
Mechanisms of regulation of pathways of intermediary metabolism; amplification of biochemical signals; substrate cycling and use of radioactive and stable isotopes to measure metabolic rates. Recommended preparation: BIOC 307 or equivalent. Offered as BIOC 452 and NTRN 452.

NTRN 433. Advanced Human Nutrition I. 4 credits.
Emphasis on reading original research literature in energy, protein and minerals with development of critical evaluation and thinking skills. Recommended preparation: NTRN 201 and CHEM 223 or equivalent.

NTRN 434. Advanced Human Nutrition II. 3 credits.
Emphasis on reading original research literature on vitamins with development of critical evaluation and thinking skills. Recommended preparation: NTRN 433 or consent.

NTRN 435. Maternal Nutrition. 3 credits.
Study of current research literature on nutrition for pregnancy, lactation, infancy and childhood, including assessment and requirements. Recommended preparation: Nutrition major or consent of instructor.

NTRN 436: Pediatric Nutrition. 3 credits.

This course will focus on understanding the nutritional needs of infants, children and adolescents. Evidence based guidelines will be used for discussions on best clinical practice for the management of pediatric nutrition issues. Anthropometric measurements used in growth assessment will be reviewed. Recommended preparation: NTRN 433.

NTRN 437. Evaluation of Nutrition Information for Consumers. 3 credits.
Reading and appraisal of food and nutrition literature written for the general public, including books, magazines, newsletters. Prereq: Graduate standing and Nutrition or Public Health Nutrition major or consent of instructor.

NTRN 438. Trends in Diet Therapy: Dietary Supplements. 3 credits

Emphasis on reading peer reviewed medical literature and understanding the mechanisms of action for the most popular dietary supplements throughout the life cycle, how to review the efficacy and safety of dietary supplements. Special focus on understanding the Dietary Supplement Health Education Act. Recommended preparation: NTRN 433 or consent.

NTRN 440. Nutrition for the Aging and Aged. 3 credits.
Consideration of the processes of aging and needs which continue throughout life. The influences of food availability, intake, economics, culture, physical and social conditions and

chronic disease as they affect the ability of the aged to cope with living situations. Recommended preparation: Nutrition major or consent of instructor.

NTRN 446. Advanced Maternal Nutrition: Special Topics. 3 credits.
Analysis of the problems commonly associated with high-risk pregnancies and fetal outcome. Discussion of causes, mechanisms, management and current research. Recommended preparation: NTRN 435 or consent.

NTRN 452. Nutritional Biochemistry and Metabolism. 3 credits.
Mechanisms of regulation of pathways of intermediary metabolism; amplification of biochemical signals; substrate cycling and use of radioactive and stable isotopes to measure metabolic rates. Recommended preparation: BIOC 307 or equivalent. Offered as BIOC 452 and NTRN 452.

NTRN 454: Isotope Tracer Methodology. 3 credits.

Stable and radioactive isotopes in metabolic research concentrating on the design of in-vitro and in-vivo investigative protocols using mostly stable isotopes and mass spectrometric analysis; critical interpretation of data from recent literature; pathway identification and kinetics.

NTRN 455: Molecular Nutrition. 3 credits

Nutrient control of gene expression in mammalian cells and deregulation of expression of these genes. The molecular basis of nutrition related diseases, such as diabetes mellitus, PKU, and LDL-receptor deficiency will be discussed. The application of genetic manipulation to metabolism and nutrition will be evaluated. Recommended preparation: Biochemistry 307 or 407.

NTRN 460: Sports Nutrition. 3 credits

Study of the relationships of nutrition and food intake to body composition and human performance. Laboratory sessions include demonstration of body composition and fitness measurements and participation in a research project. Recommended preparation: NTRN 363 or NTRN 433 or consent.

NTRN 363/461: Energy Dysregulation: From Anorexia to Obesity. 3 credits

The purpose of this course is to provide students with the knowledge of theoretical and applied concepts of exercise physiology. Students will gain an understanding of the acute and chronic physiological responses and adaptations of the cardiovascular, metabolic, hormonal, and neuromuscular systems in response to exercise. Additional topics include factors effecting performance, assessing cardiorespiratory and muscular fitness, designing exercise programs for health and wellness, special populations, and athletes, environmental considerations and nutrition's role in sport and exercise performance.

MPH Courses

INTH 401. Fundamentals of Global Health

This course seeks to integrate the multiple perspectives and objectives in global health by investigating how the disciplines of Biology, Medicine, Anthropology, Nursing, Mathematics, Engineering analyze and approach the same set of international health problems. Students will develop a shared vocabulary with which to understand these various perspectives from within their own discipline. The focus sites will emphasize issues related to the health consequences of development projects, emergency response to a health care crisis and diseases of development in presence of underdevelopment. Offered as INTH 301 and INTH 401.

MPHP 403. Research and Evaluation Methods. 3 Units.
This course is designed to provide an overview of research and evaluation methods for first-year MPH students. Through lecture, discussion and application exercises, students are introduced to the principles and processes of research and evaluation methods in public health, including formulation of research questions, aims and hypotheses and evaluation goals and objectives; literature review; development/selection of conceptual and theoretical models; quantitative, qualitative and mixed methods study designs; data collection approaches (including surveys, interviews, focus groups, observations and use of existing data); research and evaluation project management; and application of ethical principles and protection of human subjects in public health research and evaluation.

MPHP 405. Statistical Methods in Public Health. 3 Units.
This one-semester survey course for public health students is intended to provide the fundamental concepts and methods of biostatistics as applied predominantly to public health problems. The emphasis is on interpretation and concepts rather than calculations. Topics include descriptive statistics; vital statistics; sampling; estimation and significance testing; sample size and power; correlation and regression; spatial and temporal trends; small area analysis; statistical issues in policy development. Examples of statistical methods will be drawn from public health practice. Use of computer statistical packages will be introduced. Prereq: Enrollment limited to MPH students (Plan A or Plan B) and EPBI students only. All others require instructor consent.

MPHP 406. History and Philosophy of Public Health. 3 Units.
The purpose of this course is to introduce students to the science and art of public health through an understanding of the history and philosophies that represent its foundation. Students will learn about the essentials of public health and applications of those precepts throughout history and in the present. The course will examine public health case histories and controversies from the past and present, in order to better understand solutions for the future. Offered as MPHP 306 and MPHP 406. Prereq: Enrollment limited to MPH students (Plan A or Plan B) and EPBI students or instructor consent.

MPHP 411. Introduction to Health Behavior. 3 Units.
Using a biopsychosocial perspective, an overview of the measurement and modeling of behavioral, social, psychological, and environmental factors related to disease prevention, disease management, and health promotion is provided. Offered as EPBI 411 and MPHP 411. Prereq: Enrollment limited to MPH students (Plan A or Plan B) and EPBI students or consent.

MPHP 413. Health Education, Communication, and Advocacy. 3 Units.
Historical, sociological, and philosophical factors that have influenced definitions and the practice

of health education and health promotion are studied. Advanced concepts in health communication theory will also be explored. This course is designed to education, motivate, and empower undergraduate and graduate students to become advocates for their own health, the health of their peers, and the health of the community. Offered as MPHP 313 and MPHP 413.

MPHP 419. Topics in Urban Health in the United States. 3 Units.
This course examines patterns of urban health and disease across the life course among marginalized populations and communities. We will examine the socio-environmental contexts that impact health status (i.e., racism, health disparities, neighborhood context, and environmental stressors). Readings from epidemiology, sociology, and public health literature will provide a foundation for the multiple factors and processes that impact health. Offered as EPBI 419 and MPHP 419.

MPHP 421. Health Economics and Strategy. 3 Units.
This course has evolved from a theory-oriented emphasis to a course that utilizes economic principles to explore such issues as health care pricing, anti-trust enforcement and hospital mergers, choices in adoption of managed care contracts by physician groups, and the like. Instruction style and in-class group project focus on making strategic decisions. The course is directed for a general audience, not just for students and concentration in health systems management. Offered as ECON 421, HSMC 421, and MPHP 421.

MPHP 429. Introduction to Environmental Health. 3 Units.
This is a survey course of environmental health topics including individual, community, population, and global issues. Introduction to risk management, important biological mechanisms, and age and developmental impacts are covered in an overview fashion. A practical inner city home environment experience is included. Offered as EVHS 429 and MPHP 429.

MPHP 431. Statistical Methods I. 3 Units.
Application of statistical techniques with particular emphasis on problems in the biomedical sciences. Basic probability theory, random variables, and distribution functions. Point and interval estimation, regression, and correlation. Problems whose solution involves using packaged statistical programs. First part of year-long sequence. Offered as ANAT 431, BIOL 431, EPBI 431, and MPHP 431.

MPHP 432. Statistical Methods II. 3 Units.
Methods of analysis of variance, regression and analysis of quantitative data. Emphasis on computer solution of problems drawn from the biomedical sciences. Design of experiments, power of tests, and adequacy of models. Offered as BIOL 432, EPBI 432, and MPHP 432. Prereq: EPBI 431 or equivalent.

MPHP 433. Community Interventions and Program Evaluation. 3 Units.
This course prepares students to design, conduct, and assess community-based health interventions and program evaluation. Topics include assessment of need, evaluator/stakeholder relationship, process vs. outcome-based objectives, data collection, assessment of program objective achievement based on process and impact, cost-benefit analyses, and preparing the evaluation report to stakeholders. Recommended preparation: EPBI 490, EPBI 431, or MPHP 405. Offered as EPBI 433 and MPHP 433. Prereq: MPHP 411

MPHP 439. Public Health Management and Policy. 3 Units.
This course is designed to introduce students to the basics of health policy-making and includes a background on the basic structure and components of the US Health Care System (such as organization, delivery and financing). It will also cover introductory concepts in public health management, including the role of the manager, organizational design and control, and accountability. We will address relevant legal, political and ethical issues using case examples. At the end of the course, students will understand how health policy is developed and implemented in various contexts, and the challenges facing system-wide efforts at reform. This is a required course for the MPH degree. Grades will be based on a series of assignments. Prereq: Enrollment limited to MPH students (Plan A or Plan B) and EPBI Students or instructor consent.

MPHP 442. Biostatistics II. 3 Units.
This course deals with the basic concepts and applications of nonparametric statistics. Topics will include distribution-free statistics, one sample rank test, the Mann-Whitney and Kruskal Wallis tests, one sample and two sample U-statistics, asymptotic relative efficiency of tests, distribution-free confidence intervals, point estimation and linear rank statistics. Recommended preparation: EPBI 441. Offered as EPBI 442 and MPHP 442.

MPHP 447. Global Health: Outbreak Investigation in Real-Time. 3 Units.
This course provides a trans-cultural, trans-disciplinary, multimedia learning experience by analyzing historical and real-time data from the annual dengue endemics and sporadic epidemics in Puerto Rico and Brazil. A rigorous problem-centered training in the epidemiology, prevention, treatment, and control of infectious diseases using real-time and historical surveillance data of endemic and epidemic Dengue in Bahia, Brazil. This is an advanced epidemiology course in which core material will be primarily taught through reading assignments, class discussion, group projects, and class presentations. The course will utilize the online web-based communication and learning technology to create a single classroom between the CWRU and international partners with unique and complementary skills. In addition to joint classroom lectures across sites, student groups will also perform smaller-scale videoconference meetings for assigned group projects, thus creating strong international connections for the students, faculty, and our institutions. Note: Due to the complexities of time zones for this international course, the course will begin at 8:00a.m. until the U.S.A. adjusts clocks for Daylight Savings Time (unlike Brazil). Therefore, classes after the second week of March will begin at 9:00a.m. Offered as: EPBI 447, INTH 447, and MPHP 447.

MPHP 450. Clinical Trials and Intervention Studies. 3 Units.
Issues in the design, organization, and operation of randomized, controlled clinical trials and intervention studies. Emphasis on long-term multicenter trials. Topics include legal and ethical issues in the design; application of concepts of controls, masking, and randomization; steps required for quality data collection; monitoring for evidence of adverse or beneficial treatment effects; elements of organizational structure; sample size calculations and data analysis procedures; and common mistakes. Recommended preparation: EPBI 431 or consent of instructor. Offered as EPBI 450 and MPHP 450.

MPHP 451. Principles of Genetic Epidemiology. 3 Units.
A survey of the basic principles, concepts and methods of the discipline of genetic epidemiology,

which focuses on the role of genetic factors in human disease and their interaction with environmental and cultural factors. Many important human disorders appear to exhibit a genetic component; hence the integrated approaches of genetic epidemiology bring together epidemiologic and human genetic perspectives in order to answer critical questions about human disease. Methods of inference based upon data from individuals, pairs of relatives, and pedigrees will be considered. Offered as EPBI 451, GENE 451, and MPHP 451.

MPHP 456. Health Policy and Management Decisions. 3 Units.
This seminar course combines broad health care policy issue analysis with study of the implications for specific management decisions in organizations. This course is intended as an applied, practical course where the policy context is made relevant to the individual manager. Offered as HSMC 456 and MPHP 456.

MPHP 458. Statistical Methods for Clinical Trials. 3 Units.
This course will focus on special statistical methods and philosophical issues in the design and analysis of clinical trials. The emphasis will be on practically important issues that are typically not covered in standard biostatistics courses. Topics will include: randomization techniques, intent-to-treat analysis, analysis of compliance data, equivalency testing, surrogate endpoints, multiple comparisons, sequential testing, and Bayesian methods. Offered as EPBI 458 and MPHP 458.

MPHP 460. Introduction to Health Services Research. 3 Units.
This survey course provides an introduction to the field of Health Services Research and an overview of key health services research concepts and methods, including conceptual frameworks and models; outcomes research; risk adjustment; disparities in health care; policy/health care systems; cost and cost-effectiveness; quality of life, process improvement; patient satisfaction; patient safety; health economics; statistical modeling techniques; and qualitative research methods. Offered as EPBI 460 and MPHP 460.

MPHP 464. Obesity and Cancer: Views from Molecules to Health Policy. 3 Units.
This course will provide an overview of the components of energy balance (diet, physical activity, resting metabolic rate, dietary induced thermogenesis) and obesity, a consequence of long term positive energy balance, and various types of cancer. Following an overview of energy balance and epidemiological evidence for the obesity epidemic, the course will proceed with an introduction to the cellular and molecular biology of energy metabolism. Then, emerging research on biologically plausible connections and epidemiological associations between obesity and various types of cancer (e.g., colon, breast) will be presented. Finally, interventions targeted at decreasing obesity and improving quality of life in cancer patients will be discussed. The course will be cooperatively-taught by a transdisciplinary team of scientists engaged in research in energy balance and/or cancer. Didactic lectures will be combined with classroom discussion of readings. The paper assignment will involve application of course principles, lectures and readings. Offered as EBPI 464, MPHP 464.

MPHP 466. Promoting Health Across Boundaries. 3 Units.
This course examines the concepts of health and boundary spanning and how the synergy of the two can produce new, effective approaches to promoting health. Students will explore and analyze examples of individuals and organizations boundary spanning for health to identify

practice features affecting health, compare and contrast practices and approaches, and evaluate features and context that promote or inhibit boundary spanning and promoting health. Offered as MPHP 466, EPBI 466, SOCI 466, NURS 466 and BETH 466. Prereq: Graduate student status or instructor consent.

MPHP 467. Comparative and Cost Effectiveness Research. 1 Unit.
Comparative effectiveness research is a cornerstone of healthcare reform. It holds the promise of improved health outcomes and cost containment. This course is presented in a convenient 5-day intensive format in June. There are reading assignments due prior to the 1st session. Module A, Days 1-2: Overview of comparative effectiveness research (CER) from a wide array of perspectives: individual provider, institution, insurer, patient, government, and society. Legal, ethical and social issues, as well as implications for population and public health, including health disparities will also be a component. Module B, Day 3: Introduction to the various methods, and their strengths, weaknesses and limitations. How to read and understand CER papers. Module C, Days 4-5: Cost-Effectiveness Analysis. This will cover costing, cost analysis, clinical decision analysis, quality of life and cost-effectiveness analysis for comparing alternative health care strategies. Trial version of TreeAge software will be used to create and analyze a simple cost-effectiveness model. The full 3-credit course is for taking all 3 modules. Modules A or C can be taken alone for 1 credit. Modules A and B or Modules B and C can be taken together for a total of 2 credits. Module B cannot be taken alone. If taking for 2 or 3 credits, some combination of term paper, project and/or exam will be due 30 days later. Offered as EPBI 467 and MPHP 467.

MPHP 468. The Continual Improvement of Healthcare: An Interdisciplinary Course. 3 Units.
This course prepares students to be members of interprofessional teams to engage in the continual improvement in health care. The focus is on working together for the benefit of patients and communities to enhance quality and safety. Offered as EPBI 468, MPHP 468, NURS 468.

MPHP 472. Leadership and Advocacy in Urban Community Health. 3 Units.
Teams of medical and MPH students will work with the Children's Defense Fund and Cleveland neighborhood and nonprofit organizations using principles of community organization to articulate shared stories and hopes for the health and well-being of community where both the students and the organizations live and serve. While the course begins with dialogue, it will end with specific activities (performed by the students and community together) to improve community health, and a logic model for evaluating and expanding those activities. As reflection is a critical skill for leadership, the experiences in community organizing and advocacy will be counterposed with reflection on learning and will include independent reading and writing and small group discussions. Readings about leadership, advocacy and community health (particularly in cities) will include diverse perspectives and genre including work from Lao Tzu, Gandhi, Martin Luther King Jr., Shakespeare, Saul Alinsky and others. Prereq: Enrolled in MPH or JD program.

MPHP 475. Management of Disasters Due to Nature, War, or Terror. 3 Units.
The purpose of this course is to make participants aware of the special needs of children and families in disaster situations and understand public health approaches to address these needs. The learning objectives for this course are: 1) Identify the most important problems and priorities for children in disaster situations, 2) Identify the organizations most frequently involved in providing assistance in disaster situations and define their roles and strengths, 3) Describe the reasons why children are among the most vulnerable in disaster events, 4) Conduct emergency

nutritional assessments for children, 5) Develop health profiles on displaced children and plan interventions based on results, 6) Define common psychosocial issues of children and the means to address them, 7) List basic points of international law including the Geneva Convention that relate to all persons involved in disaster situations, 8) List important security issues, 9) Appreciate ethical issues involved in disaster situations and employ skills of cross cultural communication, 10) Recognize and respond to special issues for children involved in biological and chemical terrorist attacks.

MPHP 478. Assessment and Application of Health Behavior Principles to Clinical Prevention. 3 Units.
To develop an understanding of the basic principles of health behavior and related theory in an effort to better inform the assessment and delivery of clinical prevention and health promotion to both individuals and populations.

MPHP 480. Health Systems Management in Primary Care. 1 Unit.
Goal - To develop a deeper understanding of components of the health system that influence and provide shape to the environment in which health care is delivered and about the implementation of systems-based strategies that foster better processes and/or outcomes of health care delivery.

MPHP 481. A Primer of Dental Public Health. 3 Units.
This course introduces students to principles and issues in dental public health. In addition to the principles, students will learn about contemporary issues impacting dental public health, oral epidemiology , dental health care systems, and oral health promotion. To facilitate the understanding of oral health promotion, students will gain a basic understanding of the common oral diseases. Prereq: MPHP 306 or MPHP 406 and MPHP 490 or EPBI 490.

MPHP 482. Qualitative and Mixed Methods in Public Health. 3 Units.
The purpose of this course is three-fold - 1) to provide students with an understanding of the fundamentals of qualitative and mixed methods, including the history and philosophy of these methods, 2) to provide students with an understanding of and skill set associated with the use of qualitative and mixed methods in public health research, and 3) to provide students with an introduction to local professionals engaged in qualitative and mixed methods public health research. Prerequisites include MPHP 405 and 483 (or equivalents) and current status as an MPH student. Prereq: MPHP 405, MPHP 483 and current MPHP student.

MPHP 483. Introduction to Epidemiology for Public Health Practice. 3 Units.
This course is designed to introduce the basic principles and methods of epidemiology. Epidemiology has been referred to as the basic science for public health. Application of epidemiologic principles is critical to disease prevention, as well as in the development and evaluation of public policy. The course will emphasize basic methods (study design, measures of disease occurrence, measures of association, and causality) necessary for epidemiologic research. It is intended for students who have a basic understanding of the principals of human disease as well as statistics. Prereq: Must be an MPHP Plan A or MPHP Plan B, or EPBI student in order to enroll in the course.

MPHP 484. Global Health Epidemiology. 1 - 3 Unit.
This course provides a rigorous problem-centered training in the epidemiology, prevention,

treatment, and control of infectious diseases and, more generally, global health. This is an advanced epidemiology that embraces an active learning environment. Students are expected to invest time out of the classroom reading and working with classmates. Classes will be conducted with discussions, debates, group projects, and group presentations. By taking this course, students will develop a framework for interpreting, assessing, and performing epidemiologic research on issues of global importance. The course will be divided into three modules:1) Global Health Epidemiology 2) Helminth Epidemiology, and 3) Epidemiology of Disease Elimination. Each module is worth 1 credit hour and may be taken separately. Each module will have a separate project and/or exam. The final exam time will be used for group presentations and panel discussion. Active class participation is required through discussions, case studies, and group projects. Offered as EPBI 484, INTH 484, and MPHP 484.

MPHP 485. Adolescent Development. 3 Units.
Adolescent Development can be viewed as the overriding framework for approaching disease prevention and health promotion for this age group. This course will review the developmental tasks of adolescence and identify the impact of adolescent development on youth risk behaviors. It will build a conceptual and theoretical framework through which to address and change adolescent behavior to promote health.

MPHP 490. Epidemiology: Introduction to Theory and Methods. 3 Units.
This course provides an introduction to the principles of epidemiology covering the basic methods necessary for population and clinic-based research. Students will be introduced to epidemiologic study designs, measures of disease occurrence, measures of risk estimation, and casual inference (bias, confounding, and interaction) with application of these principles to specific fields of epidemiology. Classes will be a combination of lectures, discussion, and in-class exercises. It is intended for students who have a basic understanding of the principals of human disease and statistics. Offered as EPBI 490 and MPHP 490. Prereq or Coreq: EPBI 431 or requisites not met permission.

MPHP 491. Epidemiology: Case-Control Study Design and Analysis. 3 Units.
This course builds upon EPBI 490 with a comprehensive study of the concepts, principles, and methods of epidemiologic research. The course content specifically focuses on the case-control study design and provides a framework for the design, analysis, and interpretation of case-control studies. Rigorous problem-centered training includes exposure measurement, subject selection, validity, reliability, sample size and power, effect modification, confounding, bias, risk assessment, matching, and logistic regression. Individual and group data projects will be analyzed using SAS statistical software. Offered as EPBI 491 and MPHP 491. Prereq: EPBI/MPHP 490.

MPHP 492. Epidemiology: Cohort Study Design and Analysis. 3 Units.
This course provides a comprehensive introduction to the cohort study. Particular emphasis is placed on cohort study design and cohort data analysis. The course will cover the conceptual framework underlying cohort studies, planning and conducting a cohort study, basic concepts of time, exposure and outcome, and methods in the analysis of longitudinally collected data. Analytic methods covered in the class include, but are not limited to: analysis of age, period, and cohort effects, analysis of incidence rates, analysis of repeated measures, and analysis of time-to-event data. Students will have the opportunity to conduct analysis of data obtained from an actual cohort

study using a statistical package of their choice. Offered as EPBI 492 and MPHP 492. Prereq: EPBI 431 and EPBI 490 or equivalent.

MPHP 494. Infectious Disease Epidemiology. 3 Units.
This course focuses on tuberculosis (TB) and HIV epidemiology, including perspectives on these diseases in the US and globally. It is a follow-up to EPBI/MPHP 484: Global Health Epidemiology, but these courses do not necessarily need to be taken in sequence. This is an advanced course, focusing on methods and approaches in epidemiology and public health. Offered as EPBI 494, INTH 494 and MPHP 494. Prereq: EPBI 490.

MPHP 497. Cancer Epidemiology. 1 - 3 Unit.
This is a 1-3 credit modular course in cancer epidemiology and is intended for graduate students in epidemiology and biostatistics, environment health, MPH students and MD or MD/PhD students. The course will consist of 3 five-week modules: 1) introduction to cancer epidemiology (study design, etiology and causal inference, cancer statistics and cancer biology); 2) site-specific discussions of various cancers involving natural history of disease and risk factors and etiology and 3) cancer prevention and screening and cancer survivorship. Each of the modules is worth 1 credit hour for a total of 3 credit hours. Offered as: EPBI 497 and MPHP 497.

MPHP 499. Independent Study. 1 - 3 Units.

MPHP 508. Ethics, Law, and Epidemiology. 3 Units.
This course is designed to provide epidemiology students with basic knowledge about the ethical and legal principles underlying epidemiological research. This is not a public health law class. Issue papers are assigned on a weekly basis. Each issue paper requires that the student analyze the situation depicted and apply the principles learned. Some issue papers may require that the student draft a proposed rule, a portion of legislation, or a document such as an informed consent form. Other exercises may require that students critique an existing agency rule or legislation. Offered as EPBI 508 and MPHP 508. Prereq: EPBI 490 and EPBI 491 or equivalent.

MPHP 510. Health Disparities. 3 Units.
This course aims to provide theoretical and application tools for students from many disciplinary backgrounds to conduct research and develop interventions to reduce health disparities. The course will be situated contextually within the historical record of the United States, reviewing social, political, economic, cultural, legal, and ethical theories related to disparities in general, with a central focus on health disparities. Several frameworks regarding health disparities will be used for investigating and discussing the empirical evidence on disparities among other subgroups (e.g., the poor, women, uninsured, disabled, and non-English speaking populations) will also be included and discussed. Students will be expected to develop a research proposal (observational, clinical, and/or intervention) rooted in their disciplinary background that will incorporate materials from the various perspectives presented throughout the course, with the objective of developing and reinforcing a more comprehensive approach to current practices within their fields. Offered as CRSP 510, EPBI 510, MPHP 510, NURS 510, and SASS 510.

MPHP 532. Health Care Information Systems. 3 Units.
This course covers concepts, techniques and technologies for providing information systems to

enhance the effectiveness and efficiency of health care organizations. Offered as HSMC 432, MIDS 432, MPHP 532 and NUNI 432.

MPHP 650. Public Health Practicum. 3 Units.
The Public Health Practicum is an integral component of the MPH curriculum, allowing students to apply, develop, and refine their conceptual knowledge and skills as part of a planned, supervised, and evaluated community-based experience. The Practicum is designed to move students beyond the walls of academia, to understand the political, economic, social, and organizational contexts within which public health activities are conducted. To complete the Practicum, students must complete three credits of MPHP 650, dedicating at least 120 hours to a substantial public health experience, and attend Community Health Research and Practice (CHRP) group meetings. Prereq: Complete at least 9 credit hours in the MPH program and be in good academic standing.

MPHP 652. Public Health Capstone Experience. 6 Units.
Public health field practicum, involving a placement at a community-based field site, and a Master's essay. The field placement will provide students with the opportunity to apply the knowledge and skills acquired through their Master of Public Health academic program to a problem involving the health of the community. Students will learn to communicate with target groups in an effective manner; to identify ethical, social, and cultural issues relating to public health policies, research, and interventions; to identify the process by which decisions are made within the agency or organization; and to identify and coordinate use of resources at the placement site. The Master's essay represents the culminating experience required for the degree program and may take the form of a research thesis, an evaluation study, or an intervention study. Each student is required to formally present the experience and research findings. In any semester in which a student is registered for MPHP 652 credit, it is required that the student attend the Community Health Research and Practice (CHRP) group at a minimum of two sessions per 3 credits. CHRP is held once a week for approximately an hour and a half for the duration of fall, spring, and summer semesters. MPHP 652 credit is available only to Master of Public Health students.