HPH - Public Health

HPH 500: Contemporary Issues in Public Health
This course provides an introduction to the field of public health that aims to develop an appreciation of the unique and important mission of public health; an understanding of the history, values, ethics, mission, and goals of public health; and knowledge about how public health functions today including the organization, financing, policies, and practices of public health. Students will be expected to think critically about whether public health has achieved its mission in today's world and how the profession might develop in the future.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 501: Introduction to the Research Process
This course provides an overview of the research process including formulation of a research problem, conceptualization of the research design, construction of the instrument for data collection, selection of a sample, collection of data, and writing a research report. Topics include how to identify a research question and, correspondingly, how to formulate a clear, concise hypothesis or set of hypotheses; reasons and procedures for reviewing the literature; overview of observational and interventional research designs; review of measurement theory, types of scales, and commonly used measures in public health-related research; data collection methods including survey and qualitative methods; and the ethical conduct of research. Through the introduction of these topics, the course provides a general background for individuals who are interested in learning the fundamentals of how to prepare a research proposal.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 504: Surveillance & Control of Infectious Diseases
This course introduces the methods of surveillance and control of infectious diseases in the community and in health care organizations including the design, implementation, and evaluation of surveillance systems and the analysis of surveillance system data. The course focuses on infectious diseases common in the United States, but also discusses the global situation. Bioterrorism will be discussed.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 505: Topics in Population Health Studies
This course presents current topics and issues in population health studies.

1-3 credits, Letter graded (A, A-, B+, etc.)
May be repeated for credit.

HPH 506: Biostatistics I
This is part 1 of a 2-term course and is intended to provide students and researchers in public health with an introduction to the principles of statistical methods and their application in biomedical and public health research. Students are expected to enroll in parts 1 and 2 sequentially within the same academic year. This course includes introductions to the use of computers for statistical analysis, summarizing and exploring data, probability theory, discrete and continuous probability distributions, populations and samples, sampling distributions and statistical inference, hypothesis testing, sample size and power, two-sample comparisons, analysis of variance, association and correlation, simple linear regression and simple logistic regression.

Prerequisites: math placement exam score of 3 or higher.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 507: Biostatistics II
This is part 2 of a 2-term course and is intended to provide students and researchers in public health with an introduction to the principles of statistical methods and their application in biomedical and public health research. Students are expected to enroll in parts 1 and 2 sequentially within the same academic year. This course includes introductions to the use of computers for statistical analysis, summarizing and exploring data, probability theory, discrete and continuous probability distributions, populations and samples, sampling distributions and statistical inference, hypothesis testing, sample size and power, two-sample comparisons, analysis of variance, association and correlation, simple linear regression and simple logistic regression.

Prerequisites: HPH 506.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 508: Health Systems Performance
This course introduces students to the system that we have developed to deliver health care in the United States, with international comparisons. The topics include the organization and financing of health care systems, access to health care including health insurance, regulation and policy issues, and the health care workforce.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 514: Epidemiology for Public Health
This course presents basic epidemiologic concepts used to study health and disease in populations. It provides an overview of the major causes of morbidity and mortality, including methods of measurement (e.g., incidence, prevalence). Observational and experimental epidemiologic studies will be described and their advantages and disadvantages compared. The course aims for students to begin developing the skills needed to evaluate data, interpret reports, design, and conduct studies. Students will be introduced to the various areas of epidemiologic studies, including cancer, molecular/genetic, environmental, occupational, social and behavioral, and infectious disease surveillance. The course comprises both lectures and small group seminars for in-depth discussions of previously assigned topics. Prerequisites: HPH 501 and HPH 506.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 516: Environmental and Occupational Health
This course is designed to provide the fundamentals of environmental and occupational health and to educate students on issues related to major environmental and occupational concerns. It will provide a forum for the discussion of local and national environmental and occupational public health issues. The content of the course will focus on major pollutants, their detection, impact on health, and principles of remediation. Using various teaching techniques, students will be exposed to current environmental and occupational topics and approaches to prevention and treatment. The course will emphasize the most recent research in the field.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 519: Independent Study
Intensive reading, under supervision of one or more instructors, of material not covered in the formal curriculum, or execution of a research project under the supervision of one or more faculty members. Permission of MPH Academic Coordinator is required.

0-6 credits, Letter graded (A, A-, B+, etc.)
May be repeated 5 times FOR credit.

HPH 521: Introduction to Clinical Research
This introductory seminar series provides a broad-based overview of clinical science research methods, as well as guidance for critically reviewing the peer-reviewed
literature. Class lectures, exercises, and interactive small group sessions will cover framing a research question, formulating a research hypothesis, critically appraising the literature, exploring study design options, conducting research ethically and responsibly, selecting clinical outcomes, and evaluating analytical alternatives. Students enrolled in the Graduate Program in Public Health can use this course (earn credit) to their degree requirements.

1 credit, Letter graded (A, A-, B+, etc.)
May be repeated 3 times FOR credit.

**HPH 523: Social and Behavioral Determinants of Health**

This course introduces students to population health as one of the organizing concepts in public health and the orientation that differentiates public health from medicine. Consistent with public health tradition, health is discussed from an ecological perspective, and the course presents current knowledge about the multiple determinants of population health including socioeconomic status, the physical environment, medical care, individual behavior, and genetics and the interaction of these factors. Also covered is the measurement of population health, sources of data and methods for assessing population health improvements.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 525: Evaluating Public Health Initiatives**

This course introduces students to health policy analysis and public health program evaluation, two distinct fields that share similar tools, albeit with different goals in mind and approaches to meet these goals. Specifically, this course (1) draws on economics, epidemiology, political science, and biostatistics to prepare students to conduct holistic analyses of health policy issues; (2) prepares students to plan a program evaluation; and (3) prepares students to evaluate public policy options.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 527: Health Economics and Policy**

This course will provide students with a comprehensive view of the reasons behind the rapid rise in medical expenditures in the United States over nearly four decades, and the measures that have been proposed to address this problem. This course will cover the following topics: the demand and supply of medical care; the dynamics of competition in the health care industry; the role of government in medical care; general understanding of health care institutions, including Medicare, Medicaid, managed care, hospital and physician behavior, and pharmaceutical markets; and health care reform.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 529: Fundamentals of Healthcare Management**

This course is designed to provide the student a broad overview of the various issues, required skills and challenges of management in the healthcare setting. It is designed for the Health Policy and Management concentration but is open to all MPH students. Each session will consist of both a presentation by the instructor and by a student. The student presentations will be in the nature of problem solving exercises largely using illustrative cases in the assigned text. The number of presentations each student will be asked to do will vary with the class size so that there is a student presentation each week. The readings in the assigned text are required and will be used, in part, to construct the examinations.

Prerequisite: HPH 508

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 530: History of Public Health and Medicine**

This course explores major themes and interpretations in the history of public health and medicine since the 18th century. Particular emphasis is placed on the influence of social and cultural developments on medicine and public health, and vice versa. American developments will be placed in a broad comparative perspective including both Western and non-Western nations.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 534: Spatial Analysis: Health Applications**

This course is an intermediate level graduate course in the application of spatial methods for analyzing environmental exposure and disease data. Students with backgrounds in epidemiology, public health, environmental health, biostatistics, community health, biology, sociology, psychology, marine and atmospheric sciences, geosciences, demography, and geography are particularly encouraged to participate. Although the course will focus on examples related to human health, graduate students in other disciplines will find the course useful for specific and appropriately defined research purposes. Techniques for spatially analyzing point patterns and aggregated data in polygons will be introduced, including autocorrelation, clustering analysis, geostatistical smoothing, and approaches for spatial regression. Consideration of space-time variability will also be covered. This course includes theoretical elements so that the student will learn to appreciate strengths and weaknesses of different spatial approaches. Prerequisite: Course in GIS or equivalent, as determined by consent from the instructor. NOTE: Students need a foundational knowledge of Geographic Information Systems (GIS) software. This requirement can be met by completing GSS 313: GIS Design and Application I (if available), by completing other Introduction to GIS courses at Stony Brook or elsewhere, or by self-teaching using the following book: Getting to Know ArcGIS Desktop by Tim Ormsby, Eileen Napoleon, and Robert Burke.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 542: Introduction to Global Health I**

This course will provide an introduction to the field of global health and challenge both MD and MPH students to think about how a global perspective could enhance their future practice. The first half of the semester will provide an introduction to some core concepts in global health, including its definition and origin; how to measure the global burden of disease; recent progress and current challenges; social inequalities in health; health systems; and global stakeholders. The second half of the semester will narrow in on major global health topics, including child health and immunization, infection disease epidemiology, chronic disease epidemiology and sexual violence. All students will attend weekly lectures; MPH students will take part in additional small-group discussions structured around key papers and cases studies of their choosing.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 546: Introduction to Global Health 2**

This course will provide health personnel with a basic awareness of the problems of the world’s population with special focus on the poorest. To promote these objectives, this course has been designed to introduce medical and public health students to key population health topics from a global perspective, with special emphasis placed on trends in morbidity and mortality, maternal and perinatal mortality in low-income countries, and war, catastrophe and displaced persons. The health impact of emergent infectious diseases will be reviewed including water-borne diseases, emerging antibiotic resistance, bioterrorism, and parasitic disease. The design and effectiveness of foreign aid programs will be discussed. Students will be introduced to demography and the impact of population increases on the global environment. There will be discussions of the health problems of immigrants to the
U.S. from tropical countries. Finally, students will learn about vaccinations and other safety issues related to traveling and working in the tropics.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 549: Public Health Law
This course is a survey of legal and policy issues that have special relevance for public health professionals. Topics may vary, but typically will include many of the following: structure of the U.S. legal system; power of state governments in matters affecting health care; governmental power and the right to privacy; constitutional issues in social welfare benefits; governmental regulation of health care providers and payers; the scope and discretion of administrative agencies in health care; the antitrust laws; the fraud and abuse laws; and negligence in the delivery and financing of health care. Prerequisite: HPH 508.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 550: Theories of Health Behavior and Communication
In this survey theory course, students learn about the major health behavior and health communication theories that are used in population health research and practice. Rather than simply cataloguing each theory in turn, this course takes a #constant comparative# approach to the learning of theories, in which theories are dissected to their core elements and compared to each other in order to understand the points of convergence and divergence among them. The goal in taking this comparative approach is application; by knowing the core elements of various theories, students will more easily be able to choose appropriate theories to explain population health problems of interest and consider the design of interventions that are appropriate to achieve improvements in the educational, behavioral and environmental factors that may contribute to the problem. In addition to covering traditional individual-level behavior change and health communication theories, this course will focus on social change and systems theories, challenging students to think about the role of social context and systems on health behavior and health communication to achieve population health improvements. Finally, after learning about commonly-used theories in the field of public health, students will learn about and critique theories that are less-commonly used (such as new and emerging theories in the literature) and have important implications for future research, practice, and further theory development and testing among populations.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 551: Practice of Health Communications
This course provides an overview of health communications. It is designed to be a skills-building rather than theory-based course. Therefore, assignments are hands-on, often requiring students to reach beyond their comfort zone. As this is a survey course, topics provide an introduction to health communications as it relates to providers and patients, healthcare organizations, community groups, and public health and other government agencies. The course introduces health communications topics including health literacy, social marketing, and new communications technologies. Through the introduction of these topics, the course provides a general background in health communications in the context of a current public health communications issue such as pandemic influenza. Students will be expected to be abreast of health care news in all forms of media and be prepared to participate in weekly discussions about how stories have been covered. Students will also be interviewed by a journalism student in the Stony Brook School of Medicine's Clinical Skills Center, write a news profile, write a press release, write an op-ed article, and develop a social marketing tool for a current public health. As this is a communications course, class participation is essential.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 552: Planning and Implementing Community Health Initiatives
In this course, students learn how to develop theoretically-informed and evidence-based community health initiatives. Over the course of the semester, students work on developing their own culturally-competent community health initiatives, each of which is targeted at a particular population with a specific health need. Each student learns how to assess community needs and assets using a variety of methods, elaborate an initiative's theory of change through use of logic model, design theoretically-informed intervention activities appropriate to the needs/assets identified, create a budget and organizational structure, and engage key stakeholders at every facet of development and implementation of the community health initiative. Students work together in the same small group over the course of the semester to get/give feedback and hone their individual projects. Through this intense group work, students both (1) learn how to apply course concepts to several particular community health problems and (2) gain skills for working in teams on community health initiative planning and implementation. Prerequisite: HPH 550.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 553: Advanced Evaluation of Community Health Initiatives
This course prepares students to plan, implement, and utilize an evaluation of a community health initiative. Basic principles and practices of evaluation are addressed, including identifying the goals of a community health initiative; designing an evaluation plan that can determine if the initiative's goals are achieved; implementing an evaluation plan; interacting with stakeholders; and using evaluation results to improve performance.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 554: Principles of Health Education & Promotion
This course aims to provide students with the historical, theoretical, and philosophical foundations of health education and promotion. Students will be given the tools to work with community and patient populations. Students will be equipped with the knowledge, skills, and attitudes to raise people's health awareness, as well as the tools needed to teach people how to reduce their risk of disease and promote health. All students will be required to design a health education and promotion program using the knowledge and skills learned in the course.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 555: Demography and Global Health
This course introduces students to the basic theory and methods employed in the study of demography. The students will understand life table methodology, population projection, sources of demographic data, patterns in global fertility and mortality, the demographic transition, current patterns in fertility, marriage and work, abortion and contraception, and fertility/mortality interrelationships.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 559: Advanced Research Methods
This course will provide students with an in-depth review of principles of public health research methods. Emphasis will be placed on conceptualization of research questions, evaluation of research design, sample size, and issues related to potential threats to validity within a public/applied setting. Additionally, students will become familiar with how to evaluate methods used in published literature and to design their own research projects. Course topics will include how to obtain secondary data, sample size calculation, risk adjustment, bias, confounding, and interaction. The instructor will work with students as they develop their own analytic project proposals.
Students will be expected to implement their proposed research in HPH 560 Advanced Biostatistics in the following semester.  
3 credits, Letter graded (A, A-, B+, etc.)

HPH 560: Applied Biostatistics  
Students learn to formulate a scientific question in terms of a statistical model, leading to objective and quantitative answers. Topics may include analysis of variance, regression, including details of data-analytic techniques and implications for study design, measures of association, $2\times 2$ tables, stratification, matched pairs, logistic regression, model building, analysis of rates, and survival data analysis using proportional hazards models. The course stresses applications in epidemiology, and other areas of public health research. Prerequisite: HPH 507 and HPH 559.  
3 credits, Letter graded (A, A-, B+, etc.)

HPH 562: Data Management and Informatics  
This course provides students with an introduction to the principles of public health informatics and data management using the SAS systems. Lectures and labs will be aimed at developing hands-on skills about how to create, maintain, and manage databases using the SAS Systems for Windows, a major software package used frequently in public health and clinical research. In addition, the student will learn how to retrieve and summarize information about population health from major public health information systems in the U.S. Prerequisites: HPH 501 and HPH 506  
3 credits, Letter graded (A, A-, B+, etc.)

HPH 563: Cost Benefit and Cost Effectiveness Analysis  
The course will introduce the uses and conduct of cost benefit and cost effectiveness analyses as decision-making aids in the health care research. It will provide students with an understanding of the roles and limitations of cost benefit and cost effectiveness analyses and criteria for evaluating those studies. Critical issues regarding measuring cost and effectiveness, evaluating outcomes, discounting, and dealing with uncertainty will be discussed. Prerequisites: HPH 507 and HPH 562  
3 credits, Letter graded (A, A-, B+, etc.)

HPH 564: Qualitative Methods  
In this course, students learn about the logic, theory, and methods of qualitative research within population health and related fields (e.g., social welfare, nursing, medicine, sociology, and psychology). The course begins with an introduction to the epistemological and ontological underpinnings of qualitative inquiry, with special attention to how these factors affect the types of research questions often asked (and answered) by qualitative researchers. Students then learn the nuts-and-bolts of qualitative research design and data collection through review of existing qualitative studies and hands-on application. Homework and in-class exercises over the course of the semester give students practice in (a) designing a feasible qualitative research study, and (b) collecting three kinds of qualitative data: participant observation, in-depth interviews, and focus groups. The course concludes with an overview of steps for data analysis, including coding, memo-writing, and triangulation. Emphasized throughout the course are methodological issues germane to qualitative (and quantitative) research: reflexivity of the researcher, appropriate treatment of human subjects, and obtaining quality data.  
3 credits, Letter graded (A, A-, B+, etc.)

HPH 566: Clinical Trials  
This course introduces the design, conduct, and analysis of clinical trials. Topics will include types of clinical trials, study design, treatment allocation, randomization and stratification, quality control, sample size requirements, patient consent, and interpretation of results.  
2 credits, Letter graded (A, A-, B+, etc.)

HPH 575: Public Health Internship  
This course is an applied internship in a public, not-for-profit, or private sector organization that provides a public health service. Students will gain practical public health skills though a semester long internship. The student will work in the organization and prepares a weekly journal of activities, as well as a paper at the conclusion of the course, applying program knowledge to the internship activities. Graduate Graded and may be repeated for credit. MPH Academic Coordinator consent required.  
0-12 credits, Letter graded (A, A-, B+, etc.) May be repeated for credit.

HPH 580: Practicum  
The Practicum is a planned experience in a supervised and evaluated public health-related practice setting. A journal of fieldwork and a project, with a written report, are required. Students will be expected to demonstrate their "capacity to organize, analyze, interpret and communicate knowledge in an applied manner." Health departments, as well as a variety of other local organizations, offer a wide array of potential sites for the Practicum experience. Permission of MPH Academic Coordinator is required.  
3 credits, Letter graded (A, A-, B+, etc.)

HPH 581: Capstone Seminar: Population Health Issues  
This course will assist students in synthesizing the basic public health knowledge through completion of a Capstone Project. Most core and concentration course work must be complete before the student can participate in the Capstone Seminar. Permission of MPH Academic Coordinator is required.  
3 credits, Letter graded (A, A-, B+, etc.)

HPH 585: Introduction to Biostatistics & Epidemiology  
This course is an introduction to the principles of statistical methods and epidemiology and their application in the health sciences. The student will develop a basic understanding of statistics, epidemiology, and interpretation of research studies in order to communicate risk and scientific evidence to colleagues and the public, directly or through the press. Prereq: Permission of department required for Non HSC students.  
4 credits, Letter graded (A, A-, B+, etc.)

HPH 588: Seminar Series: Introduction to Biobanking, Biomedical Informatics, and Biomarker (B3)  
Biobanks are the fastest growing facilities in biomedical research, expanding every year by an estimated 20 million specimens. The biological specimens they house are at the center of healthcare and medical research, as well as as conservation in biodiversity and systems biology. Optimal management of biospecimens and their data is therefore crucial to future research and conservation. This course will provide an overview of biobanking, biomedical informatics, and biomarker discovery as the one of the newest, most dynamic and exciting disciplines in biomedical research, within the context of cancer research. The students will learn the about the theory basis, operational management issues, and ethical challenges associated with biobanking endeavors. At the end of this course, students will be able to support existing biobanking activities and to design a new Biobank venture, as well as to evaluate an ongoing Biobank’s performance  
1 credit, Letter graded (A, A-, B+, etc.)

HPH 599: Maintenance of Matriculation  
This course is for students who are maintaining matriculation while engaging in consultation with faculty regarding completion of courses
GRADUATE COURSE DESCRIPTIONS (HPH)  

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and/or master's project. Students will be graded S/F.

0-3 credits, S/F graded
May be repeated for credit.

HPH 620: Parameters of Social and Health Policy I
Introduces students to United States social policy, with special emphasis on political, economic and social factors that have affected its historical development, particularly in reference to oppressed groups. Explores relationship of social policy to ethical social work practice.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 633: Childhood Sexual Abuse and Long-Term Sequelae: Assessment and Intervention
This course focuses on the assessment and clinical intervention with adults who were sexually abused in childhood. Treatment for eating disorders, substance abuse, self-injurious behavior, sexual dysfunction, PTSD and dissociative identity disorder (DID) are addressed as well as other health related issues emanating from the trauma of childhood sexual abuse. Cultural, legal, political, and ethical dilemmas are also examined. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 636: Community Analysis and Health Promotion
Explores diverse concepts of community, analyzes a range of community structures, processes and power relationships. Investigates contemporary models, strategies and tactics of community organizing and health promotion in the United States and in selected other countries and emphasizes efforts made by poor people, ethnic minorities of color and women to organize and mobilize community groups and movements. Highlights group and community analysis and organization skills. Advanced Practice Elective.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 656: Risk Assessment, Regulation, and Homeland Security
The course focus is on risk assessment associated with nuclear, chemical and biological weapons as it relates to Homeland Security. Topics include air dispersion, uncertainty analysis, exposure measurements, epidemiology, toxicology, regulatory issues, risk management, risk communication, risk perception, and risk preparedness. The course will also cover laws and regulation, discouraging terrorism, and disaster preparedness, various acts passed by the U.S. Congress to regulate water, air, and controlled substances. Offered as EST 560 or HPH 656.

Prerequisite: Undergraduate or equivalent physics, math and chemistry.
Fall and Spring, 4 credits, Letter graded (A, A-, B+, etc.)

HPH 657: Demographic Economics I
This course deals with the economics of the family. It utilizes recently developed techniques in economics and demography to deal with questions concerning marriage, divorce, fertility, contraception, the intrafamily distribution of resources, and the intergenerational distribution of resources. Students will do original theoretical and empirical research under the professor's supervision. Prerequisite: ECO 501; Graduate standing in the Economics department or permission of the Graduate Program Director.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HPH 658: The Use of Remote Sensing and GIS in Environmental Analysis
An introduction to the use of aerial and satellite imagery in environmental analysis and the manipulation of geographic data sets of all types using Geographic Information Systems. This course is designed to teach students in archaeology, physical anthropology, and related disciplines, how satellite imagery combined with various maps can be manipulated using GIS software to perform powerful geographic analysis. Although students are eventually likely to use these tools in many different parts of the world, this course focuses on Long Island as a research area, and each student designs and completes a research project on a particular section of the area, focusing on the habitats of local wildlife, the locations of archaeological sites, coastal regimes, etc. This course presumes computer literacy and familiarity with database management. Offered as ANT 526 and DPA 526 or HPH 658.

Spring, 3 credits, Letter graded (A, A-, B+, etc.)

HPH 661: Heuristics and Quantitative Decision-Making
Complex problems (choices) need to be resolved in the course of socio-technical processes. Quantitative decision-making techniques have been evolved to address these situations. We will investigate a number of these techniques in detail, in order to understand the advantages that can be gained by using them. We will also discuss common criticisms and issues associated with these methods, and consider the heuristic methods that are often used instead to resolve complicated problems.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 662: Introduction to Systems Concepts
Understanding phenomena as "systems" requires some changes in overall analytical approaches, and a new vocabulary. General systems theory concepts such as feedback, stability, tipping point, resilience, recursion, hierarchy, and complexity will be discussed, with regard to complex systems drawn from nature, business, technology, and education. The course will address the use of feedback, information and communication, structure, and cybernetics in the management of complex systems. The role and importance of "agents" in current systems thinking will be emphasized. Students will prepare a study of a complex system and its management incorporating these general concepts.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 664: Health Economics II
Theoretical and econometric analysis of selected aspects of the health care delivery system, such as the demand for medical services, the supply and distribution of physician services, the utilization of non-physician medical personnel, alternative models of hospital behavior, third-party insurance reimbursement, national health insurance and cost, and price inflation in the hospital and long-term care sectors. Offered as ECO 646 or HPH 664.

3 credits, Letter graded (A, A-, B+, etc.)

HPH 673: Long Island's Groundwater
This course will cover basic groundwater concepts in unconsolidated sediments, and examine contamination issues in light of Long Island's particular hydrogeology, land use, and waste management history. Mathematical principles will be discussed but not stressed; scientific and technical papers discussing particular concepts or problems, including important local examples, will be closely read.
Prerequisite: Permission of instructor. Offered as MAR 521 or HPH 673. Offered in Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**HPH 684: Environmental and Waste Management in Business and Industry**

Environmental and waste management practices in industrial and other institutional settings. Technologies of hazardous waste prevention, treatment, storage, transportation, and disposal are considered. Topics include information systems and software tools for environmental audits, regulatory monitoring and compliance, cost estimation, recycling programs, air, land and water emissions controls and permits. Employee health, safety, and education and quality management and examined. Field trips to several Long Island institutions.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 686: Risk Assessment and Hazard Management**

A case-study approach to the assessment of risk and the management of natural and technological hazards, with emphasis on those that can harm the environment. The course focuses on technological hazards involving energy, transportation, agriculture, natural resources, chemical technology, nuclear technology, and biotechnology, and on natural hazards such as climatic changes, droughts, floods, and earthquakes. The first part of the course consists of readings on risk assessment and hazard management and discussions of published case studies. During the second part of the course, students conduct Offered as EST 593 or HPH 686.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 687: Diagnosis of Environmental Disputes**

Diagnosis of disagreements about environmental and waste problems. Tools for evaluating disputes about (a) scientific theories and environmental models, (b) definitions and analytical methodologies for estimating risk, "real" cost, net energy use, and life-cycle environmental impact, (c) regulatory and legal policy, (d) siting of controversial environmental facilities, and (e) fairness and other ethical issues. These diagnostic tools are brought to bear upon case studies of pollution prevention, recycling, nuclear waste disposal, and climate change.

3 credits, Letter graded (A, A-, B+, etc.)

**HPH 688: Principles of Environmental Systems Analysis**

This course is intended for students interested in learning systems engineering principles relevant to solving environmental and waste management problems. Concepts include compartmental models, state variables, optimization, and numerical and analytical solutions to differential equations.

Prerequisites: MAT 132 and one year of quantitative science such as physics, chemistry, or geology; or permission of instructor. Offered as EST 595 or HPH 688. Fall, 3 credits, Letter graded (A, A-, B+, etc.)

**HPH 689: Simulation Models for Environmental and Waste Management**

This course is intended for students interested in developing computer models for technology assessment and for environmental and waste management. Concepts developed in EST 595 Environmental Systems Engineering and Analysis are applied to real-world problems. Techniques in model development are presented in the context of applications in surface and groundwater management, acid rain, and health risks from environmental contamination. Offered as EST 596 or HPH 689.

Prerequisite: EST 595 or permission of instructor

Spring, 3 credits, Letter graded (A, A-, B+, etc.)