453 Women and Work: Issues and Policy Analysis
Spring. 3(3-0) Interdepartmental with Economics; Women's Studies. RB: (EC 201 or EC 202 or EEP 201 or concurrently) R: Not open to freshmen or sophomores.
Current and past quantity and quality of women's participation in the labor force. Gender differentials in earnings and occupations. Employment discrimination. Laws, especially affirmative action laws. Social policy effects. International issues.

470 Theory and Practice in Community and Economic Development
Fall. 3(3-0) Interdepartmental with Resource Development; Sociology. Administered by Department of Resource Development. P:M: (EC 201 or EC 202) SA: PRM 470
Concepts, principles, models, and skills for community and economic development. Community participation in local development initiatives.

490 Independent and Supervised Study
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 7 credits in all enrollments for this course. P:M: (EEP 201 or EEP 255) R: Open only to Environmental Economics and Policy majors. Approval of department; application required. SA: PRM 490
In-depth independent study of topics affecting public resource management. Complementary with previous coursework, adapted to career aspirations.

493 Professional Internship in Public Resource Management
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. RB: (EEP 201) R: Open only to juniors or seniors in the Environmental Economics and Policy major. Approval of department; application required. A student may earn a maximum of 6 credits in all enrollments for any or all of these courses: ABM 493, AEE 493, ANR 493, ANS 493, CSS 493, EEP 493, FIM 493, FW 493, HRT 493, PKG 493, PLP 493, PRR 493, and RD 493. SA: PRM 493
Supervised professional experience in agencies and businesses related to public resource management.

ENVIRONMENTAL ENGINEERING ENE

Department of Civil and Environmental Engineering
College of Engineering

427 Environmental Toxicology and Society
Spring of odd years. 3(3-0) Interdepartmental with Animal Science; Sociology. Administered by Department of Animal Science. RB: (ISB 200 or ISB 202 or ISB 204 or ISB 206H or BMB 200 or BS 111 or BS 110)
Impact of environmental chemicals on health and modern society. Cellular and organ functions and their interface with the environment. Limitations of scientific investigation and environmental regulations.

800 Environmental Engineering Seminar
Fall, Spring. 1(1-0) R: Open only to Environmental Engineering majors.
Current research in environmental engineering.

801 Dynamics of Environmental Systems
Spring. 3(3-0)
Principles of mass balance, reaction kinetics, mass transfer, reactor theory in environmental engineering.

802 Physicochemical Processes in Environmental Engineering
Fall. 3(3-0) RB: (ENE 801)
Physical and chemical principles of air and water pollution control and environmental contaminants in water, air and soils.

804 Biological Processes in Environmental Engineering
Fall. 3(3-0) RB: (ENE 801 or concurrently)
Engineering of microbial processes used in wastewater treatment, in-situ bioreclamation, and solid waste stabilization.

806 Laboratory Feasibility Studies for Environmental Remediation
Spring. 3(2-4) RB: (ENE 802 and ENE 804) R: Open only to graduate students in Environmental Engineering, Environmental Engineering-Environmental Toxicology, and Environmental Engineering Urban Studies. Not open to students with credit in ENE 803 or ENE 805.
Analysis and characterization of contaminants in soil or water. Conceptual and preliminary design of treatment systems. Use of treatability studies to evaluate treatment options. Oral presentations and preparation of consulting reports with design recommendations.

807 Environmental Analytical Chemistry
Fall. 3(3-0) R: Open only to Environmental Engineering majors.
Techniques for measurement and analysis in environmental engineering. Sample preparation. Quality assurance.

808 Environmental Analytical Chemistry Laboratory
Spring. 1(0-3) RB: (ENE 807) R: Open only to Environmental Engineering majors.
Laboratory work in environmental analytical chemistry.

880 Independent Study in Environmental Engineering
Fall, Spring, Summer. 1 to 6 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to Environmental Engineering majors.
Solution of environmental engineering problems not related to student's thesis.

890 Selected Topics in Environmental Engineering
Fall, Spring, Summer. 3(3-0) A student may earn a maximum of 9 credits in all enrollments for this course. R: Open only to Environmental Engineering majors.
Selected topics in new or developing areas of environmental engineering.

892 Master's Research Project
Fall, Spring, Summer. 1 to 5 credits. A student may earn a maximum of 5 credits in all enrollments for this course. R: Open only to master's students in the Environmental Engineering major. Approval of department.
Master's degree Plan B individual student research project. Original research, research replication, or survey and reporting on a research topic.

893 Master's Design Project
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 3 credits in all enrollments for this course. R: Open only to master's students in the Environmental Engineering major. Approval of department.
Master's degree Plan B individual student environmental engineering design project.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 8 credits. A student may earn a maximum of 24 credits in all enrollments for this course.
Master's thesis research.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 72 credits in all enrollments for this course.
Doctoral dissertation research.

EPIDEMIOLOGY EPI

Department of Epidemiology
College of Human Medicine

390 Disease in Society: An Introduction to Epidemiology and Public Health
Spring. 3(3-0) Interdepartmental with Social Science.
Human epidemiology and population health issues facing contemporary society, in both developed and less developed settings. Health-related information in the mass media and scholarly publications.

805 Readings in the Historical Roots of Epidemiological Thought
Fall. 3(3-0) Interdepartmental with History.
Historical evolution of models of disease causation and population perspectives on disease.

806 Workshop in History of Public Health
Spring. 3(3-0) Interdepartmental with History.
Historical reasoning, research and writing on a significant event or theme in history of epidemiology and public health.

810 Introduction to Descriptive and Analytical Epidemiology
Fall. 3(3-0) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 810
Study of disease from a population perspective as the interaction of host, agent, and environment. Fundamental concepts include case definition, measuring frequency of disease, mortality and morbidity data, and major study designs.

812 Causal Inference in Epidemiology
Fall. 3(3-0) RB: (EPI 810 and LCS 829) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 812
Causal models, criteria, and causality related to study design and analysis in epidemiology. Application of theoretical concepts to the design, analysis, and assessment of epidemiologic research.

813 Investigation of Disease Outbreaks
Fall, Spring, Summer. 3 credits. RB: (EPI 810 or concurrently) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 813
Principles of and practice in investigating disease outbreaks. Field trips required.

814 Nutritional Epidemiology
Fall of odd years. 3(3-0) RB: (EPI 810 or concurrently) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 814
Methodologies used in epidemiologic studies of diet and health in the context of U.S. and international dietary patterns. Relationship between diet and specific diseases.

815 Epidemiology of Cardiovascular Disease
Spring of even years. 3(3-0) RB: (EPI 810) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 815
Survey of methodologies used in epidemiologic studies of cardiovascular diseases. Review of evidence of genetic, environmental, and behavioral causes of cardiovascular disease.

816 Reproductive and Perinatal Epidemiology
Summer of odd years. 3(3-0) RB: (EPI 810 or concurrently) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 816
Epidemiology of adverse health states in pregnancy and the puerperium. Impact of these health states on subsequent child development.

817 Epidemiology of Communicable Diseases
Fall of even years. 3(3-0) RB: (EPI 810) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 817
Application of principles of epidemiology to research in communicable diseases relevant to public health in the U.S. and other countries.

818 The Epidemiology of Zoonotic Diseases
Spring of odd years. 3(3-0) Interdepartmental with Veterinary Medicine. RB: (EPI 810) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 818
Human susceptibility to diseases of animals. Modes of transmission, surveillance, and strategies for prevention of specific zoonotic diseases.

819 Spatial Epidemiology and Medical Geography
Summer of even years. 3(3-0) Interdepartmental with Geography. RB: (EPI 810) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 819
Concepts, techniques, and utilization of spatio-epidemiologic analyses for human health.

820 Evidence-Based Medicine
Spring of even years. 3(3-0) Interdepartmental with Medicine. P:M: (EPI 810 or concurrently and STT 421 or concurrently)
Methodology of clinical epidemiology and health services outcomes research. Linkage of epidemiology with daily clinical problems.

821 Epidemiology of the Health and Cognitive Status of the Elderly
Fall of odd years. 3(3-0) Interdepartmental with Family Practice. RB: (EPI 810 or concurrently) R: Open only to master's students in the Epidemiology major or approval of department. SA: FMP 821, HM 821
Interpretation of research on the health and cognitive status of elderly. Interpretation of statistical tests of hypotheses. Conclusions based on data.

822 Environmental Epidemiology
Fall of odd years. 3(3-0) P:M: (EPI 810 or concurrently and STT 421 or concurrently) RB: Basic science in biology, physiology, immunology R: Open only to graduate students in the Department of Epidemiology or approval of department.
Epidemiology of health effects and risk communication.

823 Cancer Epidemiology
Spring of odd years. 3(3-0) P:M: (EPI 810 and STT 421) R: Open only to master's students in the Epidemiology major or approval of department. SA: HM 823
Basic principles of carcinogenesis. Major etiologic factors, types of malignancies, and biomarkers for susceptibility and exposure. Prevention and early detection of cancer.

824 Reproductive Epidemiology
Fall of even years. 3(3-0) P:M: (EPI 810 or concurrently and STT 421 or concurrently) RB: Social science or biological science R: Open only to graduate students in the Department of Epidemiology or approval of department.
Epidemiology of reproductive events.

825 Epidemiologic Modeling
Spring of odd years. 3(3-0) Interdepartmental with Physics. RB: (EPI 810 and STT 422) R: Approval of department. SA: HM 825
Mathematical modeling of epidemics. Stochastic and chaotic systems approaches. Applications through personal computer software.

826 Research Methods in Epidemiology
Fall. 3(3-0) P:M: (STT 422) R: Open only to master's students in the Epidemiology major. SA: HM 826
Analyses of epidemiologic and clinical data applying statistical methods, based on logistic and survival models, using standard software.

827 The Nature and Practice of Scientific Integrity
Spring. 3(3-0) P:M: (EPI 810)
Historical development of where and how science is practiced in the United States. Scientific culture, sociology, and ethical standards. Principles, standards, and practices which define scientific integrity and responsible research conduct.

829 Design and Conduct of Epidemiological Studies and Clinical Trials
Spring. 3(2-2) Interdepartmental with Large Animal Clinical Sciences. Administered by Department of Large Animal Clinical Sciences. RB: (VM 533) or approval of department. R: Open only to graduate students in the colleges of Human Medicine, Osteopathic Medicine, or Veterinary Medicine.
Applied analytical methods in experimental design. Assessment of health and disease status of animal and human populations. Risk assessment and interpretation of clinical trials.

830 Epidemiology of Foodborne Diseases and Food Safety: An Overview
Fall. 3(3-0) Interdepartmental with Large Animal Clinical Sciences. Administered by Department of Large Animal Clinical Sciences. RB: Advanced undergraduate courses in biology, microbiology, biological sciences, biochemical sciences, food technology. R: Approval of department.
Epidemiologic survey of important foodborne diseases addressing recent trends. Sources of surveillance data. Measurement and management of risk factors associated with major foodborne diseases. Tracking foodborne pathogens from farm to table. Introduction to Hazard Analysis Critical Control Points (HACCP).

835 Topics and Methods in Neuroepidemiology
Summer of even years. 3(3-0) Interdepartmental with Neurology and Ophthalmology. RB: (EPI 810)
Epidemiology of neurologic conditions and discussion of the inherent difficulty in studying these disorders.

851 SAS Programming I: Essentials
Fall. 1(1-0) R: Open only to graduate students in the Epidemiology major or approval of department.
A programming approach to plan and write simple SAS programs to solve common data management and data analysis problems.

852 SAS Programming II: Data Management and Analysis
Spring. 1(1-0) P:M: (EPI 851) R: Open only to graduate students in the Epidemiology major or approval of department.
A programming approach to plan and write SAS programs to solve common data management and data analysis problems.

853 SAS Programming III: Research Data Analysis Using SAS
Summer. 1(1-0) P:M: (EPI 852) R: Open only to graduate students in the Epidemiology major or approval of department.
A programming approach to plan and write SAS programs to solve data management and data analysis problems in research settings.

890 Independent Study in Epidemiology
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 12 credits in all enrollments for this course. RB: (EPI 810) R: Open only to master's students in the Epidemiology major. Approval of department. SA: HM 890
Independent study in areas relevant to epidemiology such as population genetics.

899 Master's Thesis Research
Fall, Spring, Summer. 1 to 12 credits. A student may earn a maximum of 36 credits in all enrollments for this course. R: Open only to master's students in the Epidemiology major. Approval of department. SA: HM 899
Master's thesis research.

910 Themes in Contemporary Epidemiology
Fall of odd years. 3(3-0) RB: Master of Science in Epidemiology
Discussion and critique of important contemporary themes in epidemiology as reflected in current publications in the field.

915 Advanced Survival Analysis
Spring of odd years. 3(3-0) Interdepartmental with Statistics and Probability. RB: (EPI 810 and EPI 826 and EPI 852)
Methods of analysis of time to event data parametric and nonparametric models, fraility models.

920 Advanced Methods in Epidemiology and Applied Statistics
Spring of even years. 3(3-0) Interdepartmental with Statistics and Probability. P:M: (EPI 826)
Pattern recognition and cluster analysis, longitudinal data analysis, path analysis, repeated measures and time-series analysis.

925 Modeling in Epidemiology I
Fall of odd years. 3(3-0) P:M: (EPI 910) RB: Experience in statistical analysis of biological data.
Critical examination of epidemiological thinking about the determinants of non-communicable diseases.

930 Modeling in Epidemiology II
Spring of even years. 3(3-0) P:M: (EPI 910 and EPI 925) RB: Mathematics through calculus.
Critical examination of epidemiological thinking about the determinants of communicable diseases and illnesses with both communicable and non-communicable causes.

935 Research Seminar
Spring of even years. 3(3-0) P:M: (EPI 810 and LCS 829 and EPI 812) RB: Master of Science in Epidemiology or equivalent.
Conceptualization, development, and writing of research proposals in epidemiology and other forms of clinical field research.

940 Epidemiological Consultations
Spring of odd years. 3(3-0) P:M: (EPI 810) RB: Master's level training in epidemiology or biostatistics
Practical training in providing research consultations in epidemiology and biostatistics.

945 Molecular Epidemiology
Fall of even years. 3(3-0) P:M: (EPI 910 or concurrently)
Strategies for incorporation of genetic and non-genetic biomarkers in epidemiology.

950 Advanced Biostatistical Methods in Epidemiology
Fall of even years. 3(3-0) P:M: (EPI 920)
In-depth study of specific biostatistical methods and epidemiology applications.

999 Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits. A student may earn a maximum of 99 credits in all enrollments for this course. R: Open only to Ph.D. students in Epidemiology.
Doctoral dissertation research.

EXECUTIVE MBA PROGRAM EMB

The Eli Broad College of Business and The Eli Broad Graduate School of Management

801 Business as an Institution
Fall. 2(2-0) R: Open only to students in the Executive M.B.A. Program. SA: MGT 808
Institutional goals and control of the business enterprise. Positioning of the firm in the marketplace. Ethical foundations of business.

802 Accounting and Financial Concepts
Fall. 2(2-0) R: Open only to students in the Executive M.B.A. Program. SA: ACC 802 C: EMB 812 concurrently.
Financial statement relationships and analysis. Cash flow and working capital measurement and analysis. Contemporary financial reporting issues.

811 Organization Design and the Management of Change
Fall. 2(2-0) RB: (EMB 801) R: Open only to students in the Executive M.B.A. Program. SA: MGT 819
Alternative methods of organization. Dividing tasks and coordinating divided parts. Strategies for implementing new organizational forms and for changing strategies in general.

812 Managerial Accounting and Information Systems
Fall. 3(3-0) P:M: (EMB 802 or concurrently) R: Open only to students in the Executive M.B.A. Program. SA: ACC 812
Use of accounting data for planning, performance evaluation, and control. Costing and pricing. Relevant revenue and cost-based decision making. Information systems in business operations.

820 Marketing Management
Spring. 2(2-0) SA: MSC 822, MSC 823, MSC 820
Concepts, methods, and applications of decision-making to address marketing issues such as market segmentation and positioning, new product development, promotional and distribution strategies. Techniques to model and analyze marketing decision problems to ensure optimal performance results.

821 Financial Management
Spring. 3(3-0) RB: (EMB 802) R: Open only to students in the Executive M.B.A. Program. SA: FI 821
Managerial finance covering short-, intermediate- and long-term problems. Financial planning and control using financial theory and management techniques. Applications in domestic and international settings.

822 Supply Chain Management
Spring. 3(3-0) R: Open only to students in the Executive MBA Program. SA: MSC 822, MSC 823, MSC 820
Integrative approach to product design, development, and delivery. Flow of products from concept development through delivery to the final user, including product and process development, managing information and product flows, total quality management, and resource and capacity management.

828 Strategic Planning
Spring. 2(2-0) R: Open only to students in the Executive M.B.A. Program. SA: ML 818, MTA 818, MSC 818
Models and methods of business planning. Relationship of strategic intent, business missions and planning hierarchies. Linking marketing, financial, and human resource strategic plans.

831 Business Legal Environment
Summer. 2(2-0) R: Open only to students in the Executive M.B.A. Program. SA: GBL 859
Critical analysis of government regulation of business from legal, political, and social perspectives. An examination of moral concepts and social policy underlying government regulation.

836 Management in the Global Marketplace
Summer. 4(1-6) R: Open only to students in the Executive M.B.A. Program. SA: MGT 836, MSC 836
Global, comparative, and cross-cultural aspects of business. Drivers of global markets and consequences for management. International travel required.

842 Managerial Economics and Public Policy
Fall. 3(3-0) R: Open only to students in the Executive M.B.A. Program. SA: EC 842
Analysis of the firm. Demand and revenues, optimal production, cost minimization, supply, profitability, and pricing. Competitive forces and public policies in the firm's regional and international markets.

844 Leadership: An Executive Challenge
Fall. 2(2-0) R: Open only to students in the Executive M.B.A. Program. SA: MGT 839
Motivating others toward a shared vision. Classic and popular theories of leadership. Fundamental practices of exemplary leadership. Examination of personal leadership styles and development of a personal plan for leadership development.

845 New Technology and Products Management
Fall. 2(2-0) R: Open only to students in the Executive M.B.A. Program. SA: MSC 832
Strategic management of new product development processes. Planning, analytical, and decision-making concepts and tools available to market and brand managers. Global new product management best practices, product strategy and policy, introductions, product portfolio management, and organizational implications.

847 Managerial Decision Support Models
Fall. 3(3-0) R: Open only to students in the Executive M.B.A. Program. SA: MGT 847, MSC 847
Development and application of analytical models to support decision making. Topics include data analysis and multiple regression, linear optimization, decisions under uncertainty, forecasting, risk and decision analysis.