BIOSTATISTICS AND EPIDEMIOLOGY (MD) {EPID}

632. STAT METH/CATEG SURV ANA. (B)

754. ADV SURVIVAL ANALYSIS. (A)

600. Data Science for Biomedical Informatics. Himes.

Data science refers broadly to using statistics and informatics techniques to gain insights from large datasets.Biomedical informatics refers to a range of disciplines that use computational approaches to analyze biomedical data to answer pre-specified questions as well as to discover novel hypotheses.In this course, we will use R and other freely available software to learn fundamental data science applied to a range of biomedical informatics topics, including those making use of health and genomic data.After completing this course, students will be able to retrieve and clean data,perform exploratory analyses, build models to answer scientific questions, and present visually appealing results to accompany data analyses;be familiar with various biomedical data types and resources related to them;and know how to create reproducible and easily shareable results with R and github.

624. Methods in PCOR. (B) Gelfand.Prerequisite(s): Permission of instructor. The goal of this course is to provide a broad overview of methods used in patient centered outcomes research (PCOR). Expert faculty will lecture on topics such as standards for research questions, patient centeredness, systematic reviews, causal inference, heterogeneity of treatment effect handling missing data, data networks, Bayesian designs, data registries, and diagnostic tests. Topics may also include advanced observational study design, statistical methods for observational studies, health status/quality of life as applied to PCOR and case studies of patient engagement.

625. Advanced Biostatistical Methods for Multivariable Prediction Models. (B) Gimotty.Prerequisite(s): Completion of EPID526, EPID527 and either EPID510 or EPID623 or equivalent preparation in either categorical analysis or survival analysis. Working knowledge of either Stata, SAS or R to fit regression,logistic regression and/or Cox regression models. Permission of course director for students outside of School of Medicine graduate programs.

This course is an introduction to statistical methods that can be used to evaluate biomarker prognostic studies and multivariate prediction models. It is designed for advanced MS and PhD-level students in epidemiology and related fields(nursing, health policy, social work, demography). Topics will include biostatistical evaluation of biomarkers, predictive models based on various regression modeling strategies and classification trees, assessing the predictive ability of a model; internal and external validation of models; and updating prognostic models with new variables or for use in different populations. Students will learn about the statistical methods that are required by current reporting guidelines for biomarker prognostic studies or the reporting guidelines for multivariable prediction models.

635. DATABASE BIOMED RESEARCH. (A) Holmes.

This course is intended to provide in-depth, practical exposure to the design, implementation, and use of databases in biomedical research. This course is intended to provide students with the skills needed to design and conduct a research project using primary and secondary data. Topics to be covered incude: database architectures, data modeling approaches, data normalization,database implementation, client-server databases, concurrency, validation, Structured-Query Language (SQL) programming, reporting, maintenance, and security.All examples will use problems or data from biomedical domains. MySQL will be used as the database platform for the course, althoughthe principles apply generally to biomedical research and other relational databases.

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672. This course is designed to teach epidemiology students the statistical principles of analysis specific to pharmacoepidemiology study designs including the use of propensity scores, inverse probability weighting, instrumental variables and time varying covariates. Each of the twelve sessions includes both a lecture component and laboratory component. Students will learn the statistical principles and then apply them to example study data sets. (L) Ogdie-Beatty, Stephens-Sheilds.Prerequisite(s): EPID 526 and EPID 527: permission of the instructor(s).

BIOSTATISTICS (BSTA)

509. (EPID801) Introduction to Epidemiology.

510. Introduction to Anatomy and Physiology. (A) Propert.

The purpose of this course is to introduce students without a background in medicine and biology to the basic vocabulary and principles of human anatomy and physiology in preparation for collaborative research in biostatistics. The course will begin with an overview of basic human biochemistry, cell biology, and genetics. Later topics will focus on the major organ systems including circulation, digestion and excretion, neurophysiology, and reproduction. Major disease areas of research such as cancer and drug research will also be covered.

550. (PSYC611, STAT500) App Reg and Anal of Var.

620. Probability I. (A) Morrison.Prerequisite(s): Two semesters of calculus (through multivariable calculus), linear algebra. This course is also offered in the Summer I session.

This course covers Elements of matrix algebra. Discrete and continuous random variables and their distributions. Monents and moment generating functions. Joint distributions. Functions and transformations of random variables. Law of large numbers and the central limit theorem. Point estimation: sufficiency,maximum likelihood, minimum variance, confidence intervals.

621. Statisical Inference I. (B) Faculty.Prerequisite(s): BSTA 620.

Statistical inference including estimation, confidence intervals, hypothesis tests and non-parametric methods.

622. Statistical Inference II. (A) Brown.Prerequisite(s): BSTA 621.

Statistical inference including estimation, confidence intervals, hypothesis tests and non-parametric methods.

BIOSTATISTICS AND EPIDEMIOLOGY
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630. Statistical Methods for Data Analysis I. (A) Shults and Putt.Prerequisite(s): Multivariable calculus and linear algebra, BSTA 620 (may be taken concurrently).

This first course in statistical methods for data analysis is aimed at first year Biostatistics degree candidates. It focuses on the analysis of continuous data, and includes descriptive statistics, such as central tendencies, dispersion measures, shapes of a distribution, graphical representations of distributions, transformations, and testing for goodness of fit for a distribution. Populations, samples, hypotheses of differences and equivalence, and errors will be defined. One and two sample t-tests, analysis of variance, correlation, as well as non-parametric tests and correlations will be covered.

Estimation, including confidence intervals, and robust methods will be discussed. The relationship between outcome variables and explanatory variables will be examined via regression analysis, including single linear regression, multiple regression, model fitting and testing, partial correlation, residuals, multicolinearity. Examples of medical and biologic data will be used throughout the course, and use of computer software demonstrated.

752. Categorical Data Analysis II.

631. Statistical Methods and Data Analysis II. (B) Gimotty.Prerequisite(s): linear algebra, calculus, BSTA 630, BSTA 620, BSTA 621 (may be taken concurrently).

This is the second half of the methods sequence and focuses on categorical data and survival data. Topics in categorical data to be covered include defining rates, incidence and prevalence, the chi-squared test, Fisher's exact test and its extension, relative risk and odds-ratio, sensitivity, specificity, predictive values, logistic regression with goodness of fit tests, ROC curves, Mantel-Haenszel test, McNemar's test, the Poisson model, and the Kappa statistic. Survival analysis will include defining the survival curve, censoring, and the hazard function, the Kaplan-Meier estimate, Greenwood's formula and confidence bands, the log rank test, and Cox's proportional hazards regression models. Examples of medical and biologic data will be used throughout the course, and use of computer software demonstrated.

651. Introduction to Linear Models and Generalized Linear Models. (B) Tu.Prerequisite(s): linear algebra, calculus, BSTA 630, BSTA 620, BSTA 621 (may be taken concurrently).

This course extends the content on linear models in BSTA 630 and BSTA 631 to more advanced concepts and applications of linear models. Topics include the matrix approach to linear models including regression and analysis of variance, general linear hypothesis, estimability, polynomial, piecewise, ridge, and weighted regression, regression and collinearity diagnostics, multiple comparisons, fitting strategies, simple experimental designs (block designs, split plot), random effects models, Best Linear Unbiased Prediction. In addition, generalized linear models will be introduced with emphasis on the binomial, logit and Poisson log-linear models. Applications of methods to example data sets will be emphasized.

690. Consulting Laboratory I. (C) Faculty.Prerequisite(s): BSTA 630.

Participation in the consulting laboratory is a requirement for both the Master's and Ph.D. degrees. This course covers general principles of statistical consulting and statistical consulting experience. There is training on statistical programming, preparation of reports, presentations, and the communication aspects of consulting. Each student will be expected to join one of several project teams consisting of faculty, research staff, and graduate student consultants; attend meetings along with the project team and associated investigators; participate in all or part of the design, management, analysis and reporting stages of a project; and gain valuable experience in working with actual research projects.

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774. Statistical Methods for Evaluating Diagnostic Tests. (A) Gimotty.Prerequisite(s): BSTA 510, BSTA 630, BSTA 631 or equivalent; permission of instructor.

This course will cover statistical methodology for evaluating diagnostic tests.The topics will include: estimation of ROC curves, comparing multiple diagnostic tests, developing diagnostic tests using predictive models, measurement error effects on diagnostic tests, random effects models for multi-reader studies, verification bias in disease classification, methods for time-dependent disease classifications, study design issues, related software, and meta-analyses for diagnostic test data.

820. (STAT972) Statistical Inference III. (B) Faculty.Prerequisite(s): To be advised.

Statistical inference including estimation, confidence intervals, hypothesis tests and non-parametric methods.

EPIDEMIOLOGY (EPID)

Contact the department for information on courses offered in Epidemiology.

510. (BSTA511) Introductory Epidemiology. (L) Lewis.Prerequisite(s): Permission of Instructor.

This course is a series of lectures and workshops, designed to teach basic principles of epidemiologic research design. The course provides an overview of of the types of research questions that can be addressed by epidemiologic methods. Topics covered include: definitions of epidemiology; measures of disease frequency;measures of effect and association; epidemiologic study designs, bothexperimental and non-experimental; and an overview of analysis of epidemiologicstudies.

516. Disease Ecology. Levy,Smith.

The transmission of infectious diseases is a complex and ever-changing process,and the measures we have to protect ourselves against pathogens-vaccines,antibiotics,bed nets-can have equally complex and unpredictable outcomes.The aim of disease ecology is to understand pathogens and their hosts as interacting populations and to use such understanding to design rational strategies to curb or eliminate disease transmission.

A disproportionate number of emerging infectious diseases and recent disease outbreaks in the United States and elsewhere have shared a common characteristic-they affect veterinary as well as human populations. Many are also vector-borne, passing between different species of hosts through insects and other invertebrates. In some cases humans are only 'spillover hosts' whose infection is incidental to the transmission cycle. Interdisciplinary approaches are especially important to control such diseases. As a particular focus of the course, students will learn the tools needed for successful collaborations to address the growing problem of zoonotic and vector-borne diseases.

518. (PUBH517) Geography & Public Health. (B)

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526. Biostatistics for Epidemiologic Methods I. Bryan/Cucchiara.Prerequisite(s): Permission of Instructor. This course runs from mid Summer to mid Fall term.There is a corresponding lab.

The first half of this will cover graphical methods, probability, discrete and continuous distributions, estimation, confidence intervals, and one sample hypothesis testing. Emphasis is placed on understanding the proper application and interpretation of the methods. The second half of this course will cover two sample hypothesis testing, nonparametric techniques, sample size determination, correlation, regression, analysis of variance, and analysis of covariance. Emphasis is placed on understanding the proper application and underlying assumptions of the methods presented. Laboratory sessions focus on the use of the STATA statistical package and applications to clinical data.

550. (HPR 550) Clinical Economics and Clinical Decision Making. (B) Glick,Williams.Prerequisite (s): Permission of Instructor.

This course focuses on the application of decision analysis and economic analysis to clinical and policy research. The course begins with material about the selection, use, and analysis of diagnostic tests using two by two tables, likelihood ratios, and ROC curves. The course continues with the introduction of more general tools for decision analysis, including decision trees and other mathematical models. Special emphasis is placed on the assessment and use of utilities in these models. A major focus of the course is the application of economic principles to the evaluation of health outcomes. During seminars, students will carry out practical exercises that include problem solving, critically analyzing published articles, and learning to use computer software that facilitates decision and economic analyses.

527. Biostatistics for Epidemiologic Methods II. Landis,Shaw. This course runs from mid fall to mid spring term. There is a corresponding lab.

The first half of this covers concepts in biostatistics as applied to epidemiology, primarily categorical data analysis, analysis of case-control, cross-sectional, cohort studies, and clinical trials. Topics include simple analysis of epidemiologic measures of effect; stratified analysis; confounding; interaction, the use of matching, and sample size determination. The second half of this course covers concepts in biostatistics as applied to epidemiology, primarily multivariable models in epidemiology for analyzing case-control, cross-sectional, cohort studies, and clinical trials. Topics include logistic, conditional logistics, and Poisson regression methods; simple survival analyses including Cox regression. Emphasis is placed on understanding the proper application and underlying assumptions of the methods presented. Laboratory sessions focus on the use of the STATA statistical package and applications to clinical data.

532. Database Management for Clinical Epidemiology. (B) Holmes.Prerequisite(s): Permission of Instructor.

This course provides students with an introduction to the techniques of database management as they apply to clinical research. Students learn how to design and implement computerized databases, perform basic query and reporting operations, migrate data between various file formats, prepare databases for statistical analysis, and perform quality assurance procedures. This course focuses on the practical issues of database management and is intended to support each student's planned research enterprise. Each class session will be preceded by a one-hour online lecture and brief self-assessment quiz to be completed prior to attending class. This lecture is intended to prepare students for the class for the week, which will be dedicated to practical experience in a laboratory setting.

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542. Measurement of Health in Epidemiology. (A) Wiebe.Prerequisite(s): Permission of course director. Introductory Epidemiology (EPID 510) and Biostatistics for Epidemiologic Methods I (EPID526) previously or concurrently.

Epidemiologic analyses involve three types of procedures: measuring variables (e.g.risk factors), estimating population parameters (e.g.risk ratios), and testing statistical hypotheses. This course addresses the first of these procedures:measurement, which broadly encompasses the tasks involved in obtaining data, without which analyses cannot proceed. Course topics include: defining concepts of exposure, disease, and health; approaches to measuring exposure, which may be personal or environmental; approaches to measuring disease and health status; assessing the validity and reliability of measurement instruments; problems of misclassification of exposure status and disease status and problems of missing data; instrument (e.g.questionnaire) development; and qualitatative methods.

SM 560. Issues in Research Protocol Development. (B) Restricted to MSCE degree students

This course focuses on major issues in research protocol development, including methodological issues regarding different research designs, development of research questions, and plans for analysis. Each student will present his or her research proposal for open discussion during one of the sessions.

570. Critical Appraisal of the Medical Literature. (B) Restricted to MSCE degree students.

This course focuses on techniques for critical appraisal of the medical literature. Each student will be responsible for at least one critical appraisal session covering different epidemiologic topics.

575. Introduction to Genetic Epidemiology. (B) Rebbeck,Devoto.Prerequisite(s): Permission of Instructor.

Recent advances have made it feasible to incorporate data on potential genetic risk factors into traditional epidemiologic studies. Hence, there is an increasing need for epidemiologists to understand the genetic basis of disease, read, and interpret genetic studies, and incorporate the collection and analysis of genetic information into studies of disease etiology. The objectives of this course are to provide epidemiologists with an understanding of: basic genetics, the tools used by geneticists and genetic epidemiologists, and the integration of genetic data into traditional epidemiologic study designs. After completing the course, students will be able to read and interpret genetic studies. In addition, they will be able to design epidemiologic studies that incorporate genetic data collection and analysis.

580. (HPR 580) Outcomes Research. (A) Silber.Prerequisite(s): EPID 526 or equivalent, EPID 527 or equivalent, Permission of Instructor.

This course is divided into two main parts. The first part addresses issues related to the measurement of quality in healthcare. Included is a review of the classical-structure-process-outcome quality paradigm. The paradigm's strengths and limitations are addressed. This part especially focuses on outcome measures of quality and examines the validity of alternative measures. The second part deals with observational, or quasi-experimental, research studies. It addresses the advantages and limitations of alternative designs, and covers the role of clinical risk adjustment in observational studies of medical interventions. It focuses on the problem of selection bias, and reviews recent methods for dealing with this bias, such as instrumental variables.

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623. Applied Survival Analysis. (A) Hwang.Prerequisite(s): EPID 510, EPID 526. Offered second half of fall term

This course will focus on the specialized issues related to the analysis of survival or time-to-event data. The course begins by closely examining the features unique to survival data which distinguishes these data from other more familiar types. Topic include non-parametric survival analysis methods, common survival functions, parametric survival models, the proportional hazards model, and common model checking methods. All methods will be illustrated by in class examples and homework sets.

582. Systematic Review and Meta-Analysis. (A) Guevara, Umscheid.Prerequisite(s): EPID 510, EPID 526 (may be taken concurrently).

This course will provide an introduction to the fundamentals of systematic reviews and meta-analysis. It will cover introductory principles of meta-analysis; protocol development; search strategies; data abstraction methods; quality assessment; meta-analytic methods; and applications of meta-analysis.

621. Longitudinal and Clustered Data in Epidemiologic Research. (A) Localio.Prerequisite(s): Completion of EPID 526&527 or equivalent preparation in biostatistics, including generalized linear models. Completion of semester course in principles of epidemiology or equivalent. Good working knowledge of Stata and SAS and familiarity with principles of first-year calculus and matrix algebra. Permission of course director.

An introduction to the principles of and methods for longitudinal and clustered data analysis with special emphasis on clinical, epidemiologic, and public health applications. Designed for advanced MS and PhD-level students in epidemiology and related fields. Marginal and conditional methods for continuous and binary outcomes. Mixed effects and hierarchical models. Simulations for power calculations. Each student will be required to participate in 8 labs and complete associated problem sets. They may also use their own data to fulfill these requirements in part. Software will include Stata and R.

622. Applied Regression Models for Categorical Data. (A) Troxel.Prerequisite(s): EPID 510, EPID 526. Offered first half of fall term

This course will provide in-depth treatment of several topics in categorical data analysis. After a brief review of methods for contingency tables, we will introduce the idea of generalized linear models, and focus on two special cases: multiple logistic regression and loglinear models. Each topic will be presented in detail by stating the model and covering parameter estimation and interpretation, inference, model building, regression diagnostics and assessment of model fit. Finally, we will cover extensions to both models, including models for multinomial data, analysis of matched-pair data, and random effects models. Topics will be illustrated in class with examples, and we will discuss the use of STATA to conduct the analyses.

630. (REG 630) Clinical Trials. (B) Margolis.Prerequisite(s): EPID 510 or equivalent; EPID 526 or equivalent; permission of instructor.

This course is to serve as a general introduction to clinical trials, with emphasis on trial design issues. This is not a course on the biostatistics of clinical trials. It is expected that at the conclusion of the course, a studentwill be able to plan a clinical trial. Each class will consist of a two-hour lecture followed by a one hour discussion.

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634. Clinical Trial Outcomes: Measurement, Analysis and Interpretation. (A) Farrar.Prerequisite (s): EPID 510 or equivalent; permission of instructor.

This course is intended to teach students the skills necessary to select and/or design appropriate outcomes for a clinical trial. Students will focus on recent changes in our understanding of clinical trial outcome measurements, analyses, and interpretation for both subjective and objective phenomenon, such as adherence, use of multiple outcomes, and clinical importance. While design issues for clinical trials are the main focus, other types of clinical studies will be considered as appropriate. Student will be expected to learn about the problems inherent in the design of outcome measures of health and how to apply different epidemiologic and biostatistical concepts toward a solution. It is expected that at the conclusion of the course, students will be able to plan a clinical trial with a valid, responsive, and interpretable outcome.

636. Epidemiological Methods in Acute Care. (M)

This is an advanced course addressing epidemiological issues as they apply to important clinical topics in acute care, including emergency, hospital, and critical care medicine Lectures and discussions will have two primary goals: 1) to explore epidemiologic methods specific to acute care settings (i.e., choice of outcomes, risk adjustment); and 2) to explore the epidemiology of particular diseases (e.g., sepsis, acute lung injury, hospital acquired infections) and research questions of current importance in these areas. This course will acquaint students with the classic literature in the field adult and pediatric urgent care, emergency medicine, and critical care epidemiology, teach advanced epidemiological principles using a problem-based approach, and demonstrate the strengths and weaknesses of epidemiological research methodologies as they have been applied to acute care.

638. Topics in Clinical Trial Design and Analysis. (A) Ellenberg.Prerequisite(s): EPID 630 or equivalent.

This course is intended to follow, and be complementary to EPID 630: Clinical Trials. It will build on the basic principles of design, conduct, and analysis introduced in that course and will go into more detail on particular approaches.Topics covered will include noninferiority trials, phase 1 designs, multi-stage and other adaptive designs, graphical data presentations and current ethical controversies in clinical trials.

646. Reproductive EPI. (J) Barhart.

This is an advanced course that addresses epidemiological research issues as they apply to important clinical topics in obstetrics and gynecology and related clinical disciplines. Lectures and workshops are designed to acquaint students with seminal issues in the field of reproductive epidemiology, to use a body of literature to demonstrate the strengths and weaknesses of epidemiolological research designs as they have been applied to obstetrics and gynecology and related clinical disciplines, to expose students to the range oftopics studied, to teach advanced epidemiologic principles using a problem-based approach, and to stimulate students interested in reproductive epidemiology to develop independent research questions.

640. Advanced Topics in Epidemiology. (B) Kanetsky.Prerequisite(s): EPID 510 or equivalent, EPID 526 or equivalent, EPID 527 or equivalent; permission of instructor.

This course is designed to introduce students to advanced epidemiologic methods through a series of readings and discussions. The course aims to deepen the students' understanding of important concepts and controversies in contemporary epidemiology and to enhance their ability to think critically about empirical epidemiologic research. The course is intended for students who are already familiar with the fundamentals of epidemiology and biostatistics, and who wish to gain an understanding of the complex issues underlying epidemiologic study design and interpretation.

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644. Cardiopulmonary Epidemiology. (L) Kimmel.Prerequisite(s): EPID 510 or equivalent, EPID 526 or equivalent, EPID 527 or equivalent, and permission of instructor.

This is an advanced course that addresses epidemiological research issues as they apply to important clinical topics in cardiovascular and pulmonary medicine. Lectures and workshops are designed to acquaint students with the classic literature in the fields of cardiovascular and pulmonary epidemiology,to use a body of literature to demonstrate the strengths and weakness of epidemiological research designs as they have been applied to cardiovascular and pulmonary medicine to expose students to the range of topics studied to teach advanced epidemiological principles using a problem-based approach, and to stimulate students to develop independent research questions.

645. (BSTA645) Research Methods in Cancer Epidemiology. (L) Schmitz.Prerequisite(s): EPID 510 or equivalent, EPID 526 or equivalent, EPID 527 or equivalent, and permission of instructor.

Research in cancer etiology, prevention, treatment, and control includes a wide range of subject matter science, from the initial molecular changes which precede the development of cancer to issues of primary guidelines for cancer survivors. The course reviews the possible study designs applied to cancer etiology, prevention, treatment, and control. These include randomized controlled trials and multiple types of observational studies (cohort, case-control, cross-sectional). Other topics will include causal inference, bias, and effect modification.

648. Introduction to Pharmacoepidemiology I. Strom.Prerequisite(s): Permission of Instructor.

This is an advanced seminar course introducing students to the methods and approaches used in the field of pharmacoepidemiology. Topics range from an introduction to the utility of the field; to an overview of the different automated databases frequently used in pharmacoepidemiology research; selected novel applications of pharmacoepidemiology; and advanced epidemiologic methods used within pharmacoepidemiology.

649. Introduction to Pharmacoepidemiology II. Strom.Prerequisite(s): Permission of Instructor.

These seminars serve as follow-up to Topics in Pharmacoepidemiology I, continuing with topics presented in that course.

650. Introduction to Pharmacoepidemiology III. Strom.Prerequisite(s): Permission of Instructor.

These seminars serve as follow-up to Topics in Pharmacoepidemiology II, continuing with topics presented in that course.

652. Renal and Urologic Epidemiology. Feldman,Anderson,Yang.Prerequisite(s): EPID 510 or equivalent, EPID 526 or equivalent, EPID 527 or equivalent, and permission of instructor.

The objective of this course is to prepare students to function as effective, independent researchers in the fields of renal and urologic epidemiology by providing the students an understanding of how epidemiologic research can and has advance(d) the knowledge of diseases in treatments of renal and urologic medicine. The structure of the course consists of a lecture series, workshops, and student presentations.

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656. Research Methods in Infectious Diseases Epidemiology. (L) Gross,Lautenbach.Prerequisite (s): EPID 510 or equivalent, EPID 526 or equivalent,a course that covers logistical regression such as EPID 527 or equivalent,and permission of instructor(s).

This is an advanced course addressing epidemiological issues as they apply to important clinical topics in infectious diseases. Lectures and discussions will serve two primary goals: 1) to explore epidemiologic methods specific to infectious diseases (e.g. adherence to therapy) or which have important applications to infectious diseases (e.g. molecular epidemiology); and 2) to explore the epidemiology of particular infectious diseases or syndromes (e.g. HIV). This course will acquaint students with the classic literature in the field of infectious diseases epidemiology, teach advanced epidemiological principles using a problem-based approach, and demonstrate the strengths and weaknesses of research methodologies as they have been applied to infectious diseases.

658. Gastroenterology EPI. (K) Yang.Prerequisite(s): EPID 510 or equivalent, EPID 526 or equivalent, EPID 527 or equivalent, and permission of instructor.

This course provides an in-depth presentation of advanced methodological issues in conducting clinical epidemiological research in the field of gastroenterology.

690. Empirical Bioethics. (J) Halpern,Karlawish.Prerequisite(s): Permission of Instructor.

Solutions to many of the most pressing problems in modern bioethics require empirically testing assumptions and theories about human behaviors and attitudes. This course will use papers from the primary literature to teach students to understand and use the many methods that have been or could be employed to address questions lying at the intersection of ethics and clinical research. In addition to participating in weekly discussions of these topical and methodological papers, students will be expected to develop and present a protocol for research designed to explore ethical dilemmas within their own disciplines.

664. Methods in Neurologic Clinical Epidemiology. (J) Balcer,Farrar.Prerequisite(s): Permission of Instructor.

This course will introduce students to methods and study design principles that are specific or unique to clinical research and trials in neurology, child neurology,neuro-ophthalmology, neurosurgery, and related fields.

666. Pharmacoepidemiology Research Methods. (B) Hennessy.Prerequisite(s): EPID 510 or equivalent, EPID 526 or equivalent,a course that covers logistical regression such as EPID 527 or equivalent,and permission of instructor(s).

The purpose of this course is to explore and integrate concepts and considerations that are key to the conduct of pharmacoepidemiologic research. The format will be a mixture of seminar, instructor-led discussion, student-led discussion, and student presentations. Papers from the applied and methods literature will be used to illustrate concepts and as springboards for discussion. Topics covered include use of automated databases, pharmacogenomics,and approaches to addressing confounding.

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675. Advanced Methods for Analysis of Complex Genetic Traits. (M) Rebbeck,Devoto.Prerequisite(s): Permission of Instructor(s).

The recent explosion in the availability of molecular level data coupled with technological advancements allowing for large-scale sequencing creates an exciting opportunity to tailor treatment decisions to the specific genetic characteristics of a patient. Epidemiologic studies will provide the tools to draw from this array of molecular data as well as well-established environmental risk factors to predict disease outcomes. However, understanding analytic methods for characterizing the complex interactions among genetic polymorphisms, biomarkers,environmental factors, and disease outcomes is imperative to draw meaningful and relevant conclusions from these studies. Through this course, students will understand and present advanced statistical methods and how they can be applied tothe study of complex genetic traits.

SM 700. Doctoral Seminar in Epidemiology. Levy.Prerequisite(s): Permission of Instructor. Restricted to Epidemiology Doctoral Students

The course is intended to meet the needs of PhD students over the entire program from the coursework phase through the dissertation defense, and is intended to optimize cross-fertilization between the students at all phases of their program.

SM 714. Grant Writing/Review. (L) Farrar.Prerequisite(s): EPID510, EPID526, EPID560, and EPID570 or Permission of Instructor.

This course is designed to provide background, and guidance on writing and submitting NIH grants. Students will submit a mini proposal at the beginning of the term. Each proposal will be reviewed by a group of students from the class and scores will be given. The final project will be a full NIH proposal ready for submission.

721. Longitudinal and Clustered Data in Epidemiologic Research-Advanced Topics. (M) Localio,Joffe.Prerequisite(s): EPID621 or a class in longitudinal data at the graduate level, Familiarity with principles of first-year calculus and matrix algebra, Good working knowledge of Stata (or SAS) and access to Stata v10 license (intercooled or SE or MP), or to SAS v9.2 license,Permission of instructor.

Advanced methods for longitudinal and clustered data analysis with special emphasis on formal principles of causal inference, analysis of complex samples from surveys, use of Monte Carlo methods of estimation, and methods for adjusting for missing data and dropout, with applications in epidemiology, social sciences,and public health. Designed for advanced MS and PhD-level students in epidemiology and related fields. Each student will be required to participate in 6 labs and to complete the associated problem sets and exercises. Students must satisfy part of this requirement by working on their own datasets.

805. Practicum In Applied Clinical Research Methods.

813. Biostatistics in Practice Lab. Faculty.

SM 816. Economic Evaluation of Medical Therapies. Faculty.

817. Fund of Pharmacoepi..

848. Topics in Pharmacoepi I..

866. Pharmacoepidemiology Res..

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