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SURVEY RESEARCH COURSE GUIDE, 2010-11
PROGRAM ON SURVEY RESEARCH AT HARVARD UNIVERSITY
HTTP://PSR.IQ.HARVARD.EDU/

WHY STUDY SURVEY RESEARCH?
Surveys are powerful tools for data collection – used widely in academics, business, politics and government. Courses in survey research help students understand and critically evaluate data collected by surveys and the associated analyses. Students who take a variety of survey research courses develop the skills necessary to design, conduct and analyze their own surveys.

Studying survey research provides a wealth of career opportunities. Public opinion, market research and political consulting firms actively recruit Harvard graduates with skills in survey methods. Such training is also valuable for those interested in graduate study in disciplines such as health, education, law, politics, business, economics, sociology and psychology.

HOW CAN THIS COURSE GUIDE HELP?
This course guide has been compiled by Harvard's Program on Survey Research as a reference for students interested in the field of survey research. Various schools and departments offer courses related to survey research – and this guide represents our attempt to bring these listings together. Students are advised to check course catalogs for the most up-to-date and comprehensive information.

The courses are divided into broad, and sometimes overlapping, areas: *survey research methods*, including courses devoted almost exclusively to the methods of survey research; *applications of survey research*, including courses covering discipline-specific uses of survey research; *introductory* and *advanced quantitative methods*, including courses about survey data analysis (but not necessarily design or implementation) at different levels of sophistication; and *general research methods*, including courses on the logic and design of research methodologies including, but not limited to, surveys.

WHAT ABOUT PRE-REQUISITES AND PERMISSION?
The courses listed below are suggestions for Harvard students interested in learning more about survey research. Of course, it is the responsibility of students to ensure that they have the proper pre-requisites and permissions before they enroll in a course.

For more information on the courses listed below, please refer to the official listings in school course catalogues and websites – or contact the appropriate registrars directly. Students must cross-register in order to take classes in Harvard schools other than the one they are registered. Policies and deadlines for cross-registration generally vary from school to school. Students should contact their own registrar's office as well as that for the school offering the course.

Faculty of Arts and Sciences	495-1543	http://www.registrar.fas.harvard.edu/fasro/courses/index.jsp
Harvard Business School	495-6247	www.hbs.edu/mba/registrar/crossregistration.html
Harvard Grad. School of Education	495-3418	http://www.gse.harvard.edu/academics/catalogue/index.html
Harvard School of Public Health	432-1032	www.hsph.harvard.edu/administrative-offices/registrar
Harvard Medical School	432-1515	http://www.hms.harvard.edu/registrar/default.htm
Kennedy School of Government	495-1155	http://www.hks.harvard.edu/degrees/registrar/registration/cross-registration

If you have any questions or comments about this guide, please contact PSR's Assistant Director Patrick Moynihan at 212-234-7958 or pmoynihan@iq.harvard.edu.

SURVEY RESEARCH METHODS

COURSE #	TITLE	INSTRUCTOR(S)	TERM	DAY, TIME
Gov 1010a	**Survey Design**	**Moynihan/ Ansolabehere**	**Fall**	**Tu/Th, 11.30a-1p**

This course, the first in a year-long sequence, introduces students to the best practices in survey design as well as the theoretical underpinnings and concrete challenges of survey research, intended to help students better understand, interpret and critically evaluate surveys and public opinion polls. Students will have the opportunity to gain real, hands-on experience in the conceptualization and design of a survey to be fielded in the spring as part of Gov1010b.

Gov 1010b	**Survey Implementation and Analysis**	**Moynihan/ Ansolabehere**	**Spring**	**Tu/Th, 11.30a-1p**

This course, the second in a yearlong sequence, will emphasize the practical application of key principles in the field of survey research. Students will actively participate in the administration of a professionally organized survey during the semester while learning about the nuts-and-bolts of managing a survey operation. The survey data will be returned by mid-semester, allowing students the opportunity to assess their data's quality, as well as analyze/report key findings.

Bio 212	**Survey Research Methods in Community Health**	**Mangione**	**Spring**	**M/W, 3.30-5.20p**

This School of Public Health course covers research design, sample selection, questionnaire construction, interviewing techniques, the reduction and interpretation of data, and related facets of population survey investigations. Focuses primarily on the application of survey methods to problems of health program planning and evaluation. Treatment of methodology is sufficiently broad to be suitable for students who are concerned with epidemiological, nutritional, or other types of survey research.

[Stats 160	**Design and Analysis of Sample Surveys**	**Zaslavsky**	**Expected to be given in 2011–12**

*Methods for design and analysis of sample surveys. The toolkit of sample design features and their use in optimal design strategies. Sampling weights and variance estimation methods, including resampling methods. Brief overview of nonstatistical aspects of survey methodology such as survey administration and questionnaire design and validation (quantitative and qualitative). Additional topics: calibration estimators, variance estimation for complex surveys and estimators, nonresponse, missing data, hierarchical models, and small-area estimation.***]**

[Stats 260	**Design and Analysis of Sample Surveys**	**Zaslavsky**	**Expected to be given in 2011–12**

*Meets with Statistics 160, but graduate students will have an extended class period and complete additional assignments for a more theoretical, in-depth treatment of topics.***]**

[S-015	**Questionnaire Design: A Practical Guide from Conceptualization to Administration**	**Gehlbach**	**Not offered in 2010-2011**

*Although surveys are among the most common data collection methods that educational researchers, psychologists, and other social scientists employ, few of these scholars are fluent in the basic processes needed to produce valid, reliable surveys. This HGSE course will familiarize students with the steps and procedures that are essential to developing high-quality surveys. The course will focus primarily on extracting survey design practices from the extant evidence. For example, we will examine research that bears on the following questions: How many response options should survey items provide? Should the format of the items be open-ended, rankings, or ratings? How should the items be organized? In addition, students will learn a modest number of theories associated with survey design. These theories will help inform survey design particularly in the (many) areas in which there are few empirical studies. The major topics of the course include defining constructs; creating items and item wording; response scales; cognitive pretesting items; organizing, ordering, and formatting surveys; bolstering response rates; and pilot testing surveys. The course is not designed to cover sampling procedures (i.e., how to obtain a random sample of participants versus collecting a stratified random sample).***]***

SHDH 250	**Research in Social and Behavioral Health**	**Check listing**	**TBD**	**TBD**

This School of Public Health course is an introduction to research methods that are important to designing, conducting, and evaluating research that involves the assessment of social or behavioral aspects of health. The course will cover study design, measurement, data collection, and analytic issues that are important to this area of public health research. Because surveys are an important tool for social and behavioral research, a major component of this course will focus on survey design and administration. The course will present introductory level research methods and survey design with a focus on practical applications. Students will critique published studies that examine specific aspects of social and behavioral health. Students will be expected to prepare a brief proposal for a study of an aspect of social/ behavioral health that uses a survey instrument, and draft the corresponding survey instrument. The course will consist of 15 two-hour lectures with readings, in class critique of relevant studies and measures, and a final project. Requirements are completing the required reading, active participation in class, and successful completion of the project.

APPLICATIONS OF SURVEY RESEARCH

COURSE #	TITLE	INSTRUCTOR(S)	TERM	DAY, TIME

Gov 1013 **Election Polling and Public Opinion** **Moynihan** **Spring** **W, 4-6p**

This course will provide students an opportunity to examine the intersection between research methods and political discourse by focusing attention on election and public opinion polls, particularly as reported in the media and used as a source of political information by both the general public and political leaders. Students will gain practical skills in survey design and evaluation by analyzing and critically assessing current opinion polls, designing survey questions and interpreting results. Offered jointly with the Kennedy School as DPI-615.

Gov 98dt **Theory and Research in Domestic Politics and International Relations** **TBD** **Fall** **Tu, 2-4p**

The course will cover foundational material on the relationship between domestic politics and international relations. The course material will cover both security and economic relations between states, and emphasize the ways domestic political groups influence these relations. We will cover different methodological approaches to this relationship, including public opinion surveys, analysis of legislative voting, and game theoretic modeling.

Gov 1328 **Electoral Politics** **Ansolabehere** **Fall** **Tu/Th, 8.30-10a**

Elections are the foundation of American democracy. This course focuses on the simple questions: Who wins elections and why? Answers to these questions guide the interpretation of elections and evaluation of how well government represents the public preferences. The first half of the course presents the basic explanations and models of elections and voting behavior, and asks students to make their best forecast of the election. The second half of the course will examine why the models worked or didn't work. Students will learn how to interpret and analyze surveys and other data, to estimate models and make forecasts, and test arguments and models using predictions.

Gov 1362 **Democratic Citizenship Public Opinion and Participation in the U.S.** **Gay** **Fall** **Tu/Th, 10-11.30a**

Course examines the nature of public opinion and political participation. Considers how people acquire, organize, and apply their political beliefs; historical and contemporary patterns of public opinion, with emphasis on conflicts of values and social groups; who votes and why; the role of the media and political campaigns in mobilization and in formation of public opinion; and linkage between opinion, participation, and policy, with attention to whether citizens can discharge the responsibilities of democratic citizenship.

[Gov 2310 **Social Capital and Public Affairs: Research Seminar** **Putnam** **Expected to be given in 2011–12**

*Topics in the relationship between politics and civil society in the United States.***]**

[Gov 2314 **Topics in American Political Behavior** **Gay** **Expected to be given in 2011–12**

*Course surveys field of political behavior, emphasizing recent developments in literature. Topics include uncertainty; opinion change and learning; partisanship and ideology; salience of race and social identity; participation; links between public opinion, elections, and policy.***]**

[Gov 2328 **Electoral Politics** **Ansolabehere** **Expected to be given in 2011–12**

*This seminar examines the politics of US elections, with emphasis on theoretical models of electoral competition and empirical research of voting behavior and election outcomes. The first third of the seminar examines voter behavior, the second third of the seminar electoral competition among parties and candidates and aggregate election results, and the final third of the seminar examines electoral institutions and laws. Specific topics include party competition, incumbency advantages, electoral districts, campaign finance, issue and economic voting, and electoral accountability.***]**

[Gov 2881 Mass Media, Public Opinion, and Foreign Policy **Baum** **Expected to be given in 2011–12**

*This course investigates whether, how, and to what extent the mass media and public opinion interact with each other and with political leaders in order to influence the conduct of foreign policy. Offered jointly with the Kennedy School as DPI-611.***]**

Soc 210 Issues in the Interpretation of Empirical Evidence: Seminar **Lieberson** **Spring** **W, 3-5p**

Special problems occur in the interpretation of either qualitative or quantitative results based on non-experimental data – whether from surveys, historical research, or field work. These issues differ from those that can be resolved through statistical solutions.

[Soc 248 Race, Politics, and Social Inequality: Seminar **Bobo** **Expected to be given in 2011–12**

*Examines intersection of race, public will, and policy-making. Reviews theories of race-making and racial inequality, dynamics of public opinion, and effects of a racialized public sphere on social policy. Focuses on the welfare state, the criminal justice system, and the dynamics of a multiethnic society.***]**

SHDH 281 Methods for Research: Social and Behavioral Public Health **Kubzansky** **Fall** **M/W, 3.30-5.20p**

This School of Public Health course introduces methodology to explore fundamental social and behavioral science concepts and theories useful in understanding social disparities in health. The course emphasizes quantitative research social science methods applied to social and behavioral issues in public health research. Major attention is given to methodology from sociology and psychology in their application to public health problems.

SUP 575 Political Analysis and Strategy for U.S. Health Policy **Blendon** **Spring** **TBD**

(Previously offered as HCP-175) This HKS course is designed to meet the following objectives: (1) to analyze the politics surrounding major health policy developments in the United States; (2) to examine and to develop possible strategies for influencing political debates and health policy outcomes; and (3) to emphasize the ways political analysis and strategy can improve policy outcomes. Major topics to be covered include analyzing the role of interest groups, media, public opinion, legislative lobbying, elections, coalition building, policy legacies, institutions, and the politics of information as it affects health policy. Case studies focus on the enactment of the Medical Prescription Drug Bill, The Massachusetts Universal bill, as well as passionate issues such as abortion. Major movements toward comprehensive national health insurance, including the Clinton health plan, will also be covered. Leaders in political strategy from both the health and political fields will be guest lecturers. Also offered by the School of Public Health as HPM 247cd.

INTRODUCTORY QUANTITATIVE METHODS

COURSE #	TITLE	INSTRUCTOR(S)	TERM	DAY, TIME
API 201 (a,b,c,d)	**Quantitative Analysis and Empirical Methods**	**Check listing**	**Fall**	**Check listing**

This HKS course introduces students to concepts and techniques essential to the analysis of public policy issues. Provides an introduction to probability, statistics and decision analysis emphasizing the ways in which these tools are applied to practical policy questions. Topics include: descriptive statistics; basic probability; conditional probability; Bayes' rule; decision making under uncertainty; expected utility theory; sampling design; statistical inference; hypothesis testing. The course provides students an opportunity to become proficient in the use of computer software widely used in analyzing quantitative data.

Gov 50	**Introduction to Political Science Research Methods**	**Spirling/Glynn**	**Spring**	**TBD**

Can exit polls detect election fraud? What are the determinants of political corruption? Is Islam incompatible with open government? In what sense (if any) does democracy reduce the probability of war? This course introduces basic statistical techniques used in quantitative political methodology to give scientifically rigorous answers to these questions and many others. Topics covered include descriptive statistics, sampling, estimation, hypothesis tests, and applied linear and logistic regression.

Gov 1000	**Quantitative Methods for Political Science I**	**Glynn**	**Fall**	**Tu, 2-4p**

An introduction to statistical research in political science with a focus on applied multiple linear regression.

Psych 1900	**Introduction to Statistics for the Behavioral Sciences**	**Nock**	**Spring**	**M/W/F, 10-11a**

Provides a conceptual and practical introduction to statistics used in psychology and other behavioral sciences. Covers basic topics in statistics including: measures of central tendency and variability; probability and distributions, correlations and regression, hypothesis testing, t-tests, analysis of variance, and chi-square tests. Includes a lab section with instruction in statistical analysis using a computer program.

Soc 156	**Quantitative Methods in Sociology**	**Marsden**	**Spring**	**M/W, 10-11.30a**

Introduces quantitative analysis in social research, including principles of research design and the use of empirical evidence, particularly from social surveys. Descriptive and inferential statistics, contingency table analysis, and regression analysis. Emphasis on analysis of data and presentation of results in research reports.

Stats 100	**Introduction to Quantitative Methods for the Social Sciences and Humanities**	**Glickman/ Harrington**	**Fall/ Spring**	**Check listing**

Introduction to key ideas underlying statistical and quantitative reasoning. Topics covered: methods for organizing, summarizing and displaying data; elements of sample surveys, experimental design and observational studies; methods of parameter estimation and hypothesis testing in one- and two-sample problems; regression with one or more predictors; correlation; and analysis of variance. Explores applications in a wide range of fields, including the social and political sciences, medical research, and business and economics.

Stats 101	**Introduction to Quantitative Methods for Psychology and the Behavioral Sciences**	**Agresti**	**Fall**	**Tu/Th, 10-11.30a**

Similar to Statistics 100, but emphasizes concepts and practice of statistics used in psychology and other social and behavioral sciences. Topics covered: describing center and variability; probability and sampling distributions; estimation and hypothesis testing for comparing means and comparing proportions; contingency tables; correlation and regression; multiple regression; analysis of variance. Emphasis on translation of research questions into statistically testable hypotheses and models, and interpretation of results in context.

Stats 104	**Introduction to Quantitative Methods for Economics**	**Parzen**	**Fall/ Spring**	**Check listing**

Similar to Statistics 100, but emphasizes applications in fields including, but not limited to, economics, health sciences and policy analysis. Topics covered: descriptive and summary statistics for both measured and counted variables; elements of experimental and survey design; probability; and statistical inference including estimation and tests of hypotheses as applied to one- and two-sample problems, multiple regression, correlation, and analysis of variance. Taught at a slightly higher level than Statistics 100 and 101.

S-012	**Empirical Methods: Introduction to Statistics for Research**	**Tivnan**	**Fall**	**Tu/Th, 11.30a-1p**

This HGSE course covers the basic principles of elementary statistics, providing a good foundation for students intending to do further course work and research involving the use of statistical analyses. Topics will include basic descriptive measures; sampling and sample size estimation; testing for differences between means, correlation, and measures of association; techniques for analyzing categorical data; and summarizing and presenting statistical results. There will be a heavy emphasis on applications of basic statistical concepts to a wide variety of problems encountered in educational and policy-related research. The focus will be on understanding how to use and interpret the statistical procedures commonly used in quantitative research. The use of computer packages for assisting in data analysis will be emphasized throughout the course. There will be several take-home assignments involving data analysis and reporting of research results.

S-040	**Introduction to Research Methods and Data Analysis in Education**	**Masyn**	**Fall**	**Tu/Th, 8.15-10a**

Often when quantitative evidence is being used to answer questions, scholars and decision-makers must either analyze empirical data themselves or thoughtfully manage and appraise the analyses of others. This HGSE course will cover the basic principles of empirical inquiry and quantitative analysis. By examining real data gathered to address questions in educational, psychological, and social research settings, students will become acquainted with the formulation of research questions and research hypotheses; sampling; basic descriptive statistics; tabular and graphical methods for displaying data; the notion of statistical inference; analytic methods for exploring relationships with both categorical and continuous measures; and the foundations of statistical modeling with simple and multiple linear regression along with analysis of variance (ANOVA) and analysis of covariance (ANCOVA). There will be an emphasis on applying the statistical concepts; in particular, how to (1) select the appropriate statistical techniques; (2) properly execute those techniques; (3) examine the assumptions necessary for the technique to work appropriately; (4) interpret analytic results; and (5) summarize the findings in a cogent manner. Because quantitative skills are best learned through practice, computer-based statistical analyses will be an integral part of the course. There will be several take-home assignments involving data analysis and the interpretation and reporting of research results.

ADVANCED QUANTITATIVE METHODS

COURSE #	TITLE	INSTRUCTOR(S)	TERM	DAY, TIME
API 202 (a,b,c,d)	**Empirical Methods II**	**Check listing**	**Spring**	**Check listing**

Intended as a continuation of API 201, this HKS course equips students with an understanding of common tools of empirical analysis in policy applications. Much of the learning will take place through hands-on analysis of data sets. The course will cover regression analysis, including multiple regression, dummy variables, and binary dependent variables; as well as program evaluation, including selection effects; the advantages and disadvantages of experimental, quasi-experimental, and observational data; and instrumental variable techniques. The final part of the course includes an integrative exercise in which students will have the opportunity to assess empirical analysis in an open-ended and professionally realistic project. Prerequisite: API 201 or equivalent.

API 205	**Politics and Policies: What Can Statistics Tell Us?**	**Hallett**	**Fall**	**Tu/Th, 10.10-11.30a; Review F, 1.10-2.30p**

Intended for decision makers, this HKS course provides a broad overview of the major concepts of statistics. The focus is on critical interpretation, with applications to policy analysis and program evaluation. Includes experimental design, sampling methods, probability, confidence intervals, hypothesis tests, and regression. Using case studies, the course asks what insight data can provide—and what it cannot—and compares the perspectives of statistics and ethics.

API 208	**Program Evaluation: Estimating Program Effectiveness with Empirical Analysis**	**Abadie**	**Spring**	**Tu/Th, 1.10-2.30p**

Program evaluation comprises a set of statistical tools for assessing the impact of public interventions. This methodological HKS course will develop students' skills in quantitative program evaluation. Students will study a variety of evaluation designs (from random assignment to quasi-experimental evaluation methods) and analyze data from actual evaluations, such as the national Job Training Partnership Act Study. The course evaluates the strengths and weaknesses of alternative evaluation methods. This course meets the PhD requirement for empirical methods. Prerequisite: Familiarity with the basic concepts of statistical inference and regression analysis (such as API 202 or API 210).

API 209	**Advanced Quantitative Methods I: Statistics**	**Levy**	**Fall**	**Tu/Th, 1.10-2.30p; Check review listing**

The goal of this HKS course is to prepare students to analyze public policy issues using statistics. Topics included fall in the areas of probability theory, sampling, estimation, hypothesis testing, and regression analysis. While many students taking this class will have already taken courses in statistics and regression analysis, this course will probably place a much stronger emphasis than typical courses on conceptually understanding the statistical methods. Since the course is targeted to first-year students in the MPA/ID program, we will not shy away from using the mathematical tools needed to develop the conceptual understanding. But the emphasis of the course will be on the conceptual understanding and application of the tools rather than on the math or the mechanics behind the tools. Prerequisites: Multivariate calculus or linear algebra

API 210	**Advanced Quantitative Methods II: Econometric Methods**	**Abadie**	**Spring**	**M/W, 2.40-4p; Check review listing**

Intended as a continuation of API 209, Advanced Quantitative Methods I, this HKS course focuses on developing the theoretical basis and practical application of the most common tools of empirical analysis including non-linear models, instrumental variables, and panel data. Foundations of analysis will be coupled with hands-on examples and assignments involving the analysis of data sets. Prerequisite: API 209 or permission of instructor.

API 217 **Introduction to Applied Econometrics** **Jorgenson** **Fall** **TBD**

This HKS course is an introduction to methods employed in applied econometrics, including linear regression, instrumental variables, panel data techniques, generalized method of moments, and maximum likelihood. It also includes detailed discussion of papers in applied econometrics and computer exercises using standard econometric packages. Prerequisites: API 209 and 210 or Econ 2110.

Bio 200 **Principles of Biostatistics** **Harrington** **Fall** **Tu/Th, 9-10.20a**

Lectures and laboratory exercises acquaint the student with the basic concepts of biostatistics and their applications and interpretation. The computer is used throughout the course. Topics include descriptive statistics, graphics, diagnostic tests, probability distributions, inference, tests of significance, association, linear and logistic regression, life tables, and survival analysis.

Bio 201 **Introduction to Statistical Methods** **Gauvreau** **Fall** **Tu/Th, 3.30-4.50p**

Covers basic statistical techniques that are important for analyzing data arising from epidemiology, environmental health and biomedical and other public health-related research. Major topics include descriptive statistics, elements of probability, introduction to estimation and hypothesis testing, nonparametric methods, techniques for categorical data, regression analysis, analysis of variance, and elements of study design. Applications are stressed. Designed as an alternate to BIO200, for students desiring more emphasis on theoretical developments. Background in algebra and calculus strongly recommended.

Bio 222 **Basics: Statistical Inference** **Li** **Fall** **Tu/Th, 8.30-10.20a**

This course will provide a basic, yet thorough introduction to the probability theory and mathematical statistics that underlie many of the commonly used techniques in public health research. Topics to be covered include probability distributions (normal, binomial, Poisson), means, variances and expected values, finite sampling distributions, parameter estimation (method of moments, maximum likelihood), confidence intervals, hypothesis testing (likelihood ratio, Wald and score tests). All theoretical material will be motivated with problems from epidemiology, biostatistics, environmental health and other public health areas. This course is aimed towards second year doctoral students in fields other than Biostatistics. Background in algebra and calculus required.

Biostats 230 **Probability Theory & Applications I** **Schwartzman** **Fall** **M/W, 8.30-10.20a and lab**

Axiomatic foundations of probability, independence, conditional probability, joint distributions, transformations, moment generating functions, characteristic functions, moment inequalities, sampling distributions, modes of convergence and their interrelationships, laws of large numbers, central limit theorem, and stochastic processes.

Biostats 231 **Statistical Inference I** **Betensky** **Spring** **M/W, 10.30a-12.20p and lab**

Exponential families, sufficiency, ancillarity, completeness, method of moments, maximum likelihood, unbiased estimation, Rao-Blackwell and Lehmann-Scheffe theorems, information inequality, Neyman-Pearson theory, likelihood ratio, score and Wald tests, uniformly and locally most powerful tests, asymptotic relative efficiency.

Biostats 232 **Methods I** **Lin** **Fall** **M/W, 10.30a-12.20p**

Introductory course in the analysis of Gaussian and categorical data. The general linear regression model, ANOVA, robust alternatives based on permutations, model building, resampling methods (bootstrap and jackknife), contingency tables, exact methods, logistic regression.

Biostats 233	**Methods II**	**Coull**	**Spring**	**M/W, 8.30-10.20a and lab**

Intermediate course in the analysis of Gaussian, categorical, and survival data. The generalized linear model, Poisson regression, random effects and mixed models, comparing survival distributions, proportional hazards regression, splines and smoothing, the generalized additive model.

Biostats 235	**Regression and Analysis of Variance**	**Cai**	**Fall**	**M/W, 10.30a-12.20p**

An advanced course in linear models - regression and analysis of variance. Estimation (maximum likelihood and least squares) and inference (confidence intervals, hypothesis testing, analysis of residuals) are presented from a theoretical and data analysis perspective.

Biostats 245	**Analysis of Multivariate and Longitudinal Data**	**Wypij**	**Spring**	**Tu/Th, 10.30a-12.20p**

The multivariate normal distribution, Hotelling's T2, MANOVA, repeated measures, the multivariate linear model, random effects and growth curve models, generalized estimating equations, multivariate categorical outcomes, missing data, computational issues for traditional and new methodologies.

Biostats 251	**Statistical Inference II**	**Rotnitzky**	**Spring**	**Tu/Th, 1.30-3.20p**

Advanced topics in statistical inference. Limit theorems, multivariate delta method, properties of maximum likelihood estimators, saddle point approximations, asymptotic relative efficiency, robust and rank-based procedures, resampling methods, nonparametric curve estimation.

Econ 1123	**Introduction to Econometrics**	**Stock/Chaney**	**Fall/ Spring**	**Check listing**

An introduction to multiple regression techniques with focus on economic applications. Discusses extensions to discrete response, panel data, and time series models, as well as issues such as omitted variables, missing data, sample selection, randomized and quasi-experiments, and instrumental variables. Aims to provide students with an understanding of and ability to apply econometric and statistical methods using computer packages.

Econ 1126	**Quantitative Methods in Economics**	**Chamberlain**	**Spring**	**Tu/Th, 11.30a-1p**

Topics include elements of statistical decision theory and related experimental evidence; some game theory and related experimental evidence; maximum likelihood; logit, normal, probit, and ordered probit regression models; panel data models with random effects; omitted variable bias and random assignment; incidental parameters and conditional likelihood; demand and supply.

Econ 1127	**Statistical Methods for Evaluating Causal Effects**	**Rubin**	**Spring**	**Tu/Th, 2.30-4p**

Statistical methods discussed for inferring causal effects from data from randomized experiments or observational studies. Students will develop expertise to assess the credibility of causal claims and the ability to apply the relevant statistical methods for causal analyses. Examples will come from many disciplines: economics, education, other social sciences, epidemiology, and biomedical science. Evaluations of job training programs, educational voucher schemes, changes in laws such as minimum wage laws, medical treatments, smoking, military service.

Econ 2110	**Introductory Probability and Statistics for Economists**	**Ibragimov**	**Fall**	**M/W, 10-11.30a**

Introduction to probability and statistics. Emphasis on general methods applicable to both econometrics and economic theory. Topics include probability spaces, random variables, limit laws, estimation, hypothesis testing, and Bayesian methods.

Econ 2120	**Introduction to Applied Econometrics**	**Jorgenson/ Chamberlain**	**Fall/ Spring**	**Tu/Th, 2.30-4p**

Introduction to methods employed in applied econometrics, including linear regression, instrumental variables, panel data techniques, generalized method of moments, and maximum likelihood. Includes detailed discussion of papers in applied econometrics and computer exercises using standard econometric packages

Econ 2140	**Econometric Methods**	**Imbens**	**Fall**	**Tu/Th, 11.30a-1p**

Econometric methods for cross-section and panel data. Topics include generalized method of moments, empirical likelihood, instrumental variables, bootstrapping, clustering, treatment effects, selection bias, difference-in-differences, qualitative choice, quantile regression, nonparametric methods, and semiparametric methods.

Econ 2142	**Time Series Analysis**	**Stock/Ibragimov**	**Fall**	**Tu/Th, 8.30-10a**

A survey of modern time series econometrics. Topics include univariate models, vector autoregressions, linear and nonlinear filtering, frequency domain methods, unit roots, structural breaks, empirical process theory asymptotics, forecasting, and applications to macroeconomics and finance.

Econ 2144	**Advanced Applied Econometrics**	**Pakes**	**Spring**	**M/W, 11.30a-1p**

An introduction to the theory and application of recently developed econometric techniquesused in advanced applied work. Simulation techniques, estimation subject to inequality restrictions, as well as semiparametric and nonparametric tools will be studied in a variety of empirical contexts.

Gov 1002	**Advanced Quantitative Political Methodology**	**King**	**Spring**	**M, 2-4p**

Introduces theories of inference underlying most statistical methods and how new approaches are developed. Examples include discrete choice, event counts, durations, missing data, ecological inference, time-series cross sectional analysis, compositional data, causal inference, and others.

Gov 2000	**Introduction to Quantitative Methods I**	**Glynn**	**Fall**	**Tu, 2-4p**

Graduate-level version of Gov. 1000. Meets with Gov. 1000, an introduction to statistical research in political science with a focus on applied linear regression. Will require extra homework and examination problems in addition to those for Gov. 1000.

Gov 2001	**Advanced Quantitative Research Methodology**	**King**	**Spring**	**M, 2-4p**

Graduate-level version of Gov. 1002. Meets with Gov. 1002, introduces theories of inference underlying most statistical methods and how new approaches are developed. Examples include discrete choice, event counts, durations, missing data, ecological inference, time-series cross sectional analysis, compositional data, causal inference, and others. Will require extra homework and examination problems in addition to those for Gov. 1002.

Gov 2002	**Topics in Quantitative Methods**	**Spirling**	**Fall**	**Th, 4-6p**

Introduction to two broad areas of modern statistics – graphical modeling and nonparametric inference. Illustrates how ideas and methods from each of these areas can be fruitfully applied to two different application areas – statistical natural language processing and causal inference.

Psych 1950	**Intermediate Statistical Analysis in Psychology**	**Moulton**	**Fall**	**M/W, 1-2:30p; Lab Th, 10-11:30a**

This course offers foundational exposure to psychological statistics, focusing heavily on analysis of variance (one-way, factorial, repeated-measures, mixed-model). Other topics include: exploratory data analysis, sampling distributions, null hypothesis significance testing, t-tests, fixed versus random effects, post hoc and planned comparisons, correlation, simple regression, the general linear model, chi-square tests, nonparametric statistics, confidence intervals, and meta-analysis.

Psych 1952	**Multivariate Analysis in Psychology**	**Sidanius**	**Spring**	**Lecture M/W, 1-2:30p; Lab Th, 5-6:30p**

This course introduces the empirical measurement of abstract constructs and multivariate analysis. Topics include: reliability and validity, multiple regression, exploratory and confirmatory factor analyses, discriminant analysis, canonical correlation analysis and structural equation modeling.

[Psych 3800	**Psychometric Theory**	**McNally**	**Expected to be given in 2011–12**

*Covers basic psychometric theory and methods essential for reliable and valid measurement. Reliability, validity, and generalizability reviewed. Detailed survey of techniques used to create and evaluate a scale.***]**

Soc 202	**Intermediate Quantitative Research Methods**	**Marsden**	**Spring**	**Tu/Th, 10-11.30a**

Research designs and measurement techniques used in quantitative sociological research. Regression methods for continuous and binary response variables, including categorical predictors, nonlinearity interactions, diagnostics, and criticism. Emphasis on applications and implementation.

Soc 203a	**Advanced Quantitative Research Methods**	**Winship**	**Fall**	**Tu/Th, 10a-12p**

Matrix approach to regression analysis with an emphasis on the assumptions behind OLS. Instrumental variables, generalized least squares, probit and logit models, survival analysis, hierarchical linear models, and systems of equations are studied.

[Soc 203b	**Analysis of Longitudinal Data: Seminar**	**Marsden**	**Expected to be given in 2011–12**

*Treats longitudinal design and methods for the statistical analysis of longitudinal data with an emphasis on the analysis of change in discrete variables. Includes introduction to time series analysis. Statistical theory and practical applications covered.***]**

Soc 303a	**Advanced Topics in Quantitative Research**	**Winship**	**Fall/ Spring**	**TBD**

Examines current methodological scholarship in the social sciences with an eye to assessing its quality and potential for advancing quantitative methods. Recently published and unpublished work by local scholars examined.

Stats 110	**Introduction to Probability**	**Blitzstein**	**Fall**	**M/W/F, 12p**

A comprehensive introduction to probability. Basics: sample spaces and events, conditional probability, and Bayes' Theorem. Univariate distributions: density functions, expectation and variance, Normal, t, Binomial, Negative Binomial, Poisson, Beta, and Gamma distributions. Multivariate distributions: joint and conditional distributions, independence, transformations, and Multivariate Normal. Limit laws: law of large numbers, central limit theorem. Markov chains: transition probabilities, stationary distributions, convergence.

Stats 111	**Introduction to Theoretical Statistics**	**Airoldi**	**Spring**	**Tu/Th, 1-2.30p**

Basic concepts of statistical inference from frequentist and Bayesian perspectives. Topics include maximum likelihood methods, confidence and Bayesian interval estimation, hypothesis testing, least squares methods and categorical data analysis.

Stats 131	**Time Series Analysis and Forecasting**	**Dasgupta**	**Fall**	**Tu/Th, 1-2.30p**

An introduction to time series models and associated methods of data analysis and inference. Auto regressive (AR), moving average (MA), ARMA, and ARIMA processes, stationary and non-stationary processes, seasonal processes, auto-correlation and partial auto-correlation functions, identification of models, estimation of parameters, diagnostic checking of fitted models, forecasting, spectral analysis, and transfer function models.

Stats 135 **Statistical Computing Software** **Finch** **Fall** **M/W/F, 10a**

An introduction to major statistics packages used in academics and industry (SAS and R). Will discuss data entry and manipulation, implementing standard analyses and graphics, exploratory data analysis, simulation-based methods, and new programming methods.

Stats 139 **Statistical Sleuthing Through Linear Models** **Lee** **Fall** **Tu/Th, 11.30a-1p**

A serious introduction to statistical inference where linear models and related methods are used. Topics include the pros and cons of t-tools and their alternatives, multiple-group comparisons, linear regressions, model checking and refinement. Emphasis on statistical thinking and tools for real-life problems, application to current events whenever relevant.

Stats 149 **Statistical Sleuthing through Generalized Linear Models** **Pillai** **Spring** **M/W, 1-2.30p**

A sequel to Statistics 139, emphasizing common methods for analyzing categorical data. Topics include mixed effects model, contingency tables, log-linear models, logistic, Probit and Poisson regression, model selection, and model checking. Examples will be drawn from several fields, particularly from biology and social sciences.

Stats 210 **Probability Theory** **Blitzstein/Morris** **Fall** **M/W, 2.30-4p**

Random variables, measure, representations. Families of distributions: Multivariate Normal, conjugate, marginals, mixtures. Conditional distributions and expectation. Convergence, laws of large numbers, central limit theorems, and martingales.

Stats 211 **Statistical Inference** **Morris/Blitzstein** **Spring** **M/W, 2.30-4p**

Inference: frequency, Bayes, decision analysis, foundations. Likelihood, sufficiency, and information measures. Models: Normal, exponential families, multilevel, and non-parametric. Point, interval and set estimation; hypothesis tests. Computational strategies, large and moderate sample approximations.

Stats 230 **Multivariate Statistical Analysis** **Kou** **Fall** **F, 2-5p**

Multivariate inference and data analysis. Advanced matrix theory and distributions, including Multivariate Normal, Wishart, and multilevel models. Supervised learning: multivariate regression, classification, and discriminant analysis. Unsupervised learning: dimension reduction, principal components, clustering, and factor analysis.

Stats 231 **Time Series Analysis and Forecasting** **Dasgupta** **Fall** **Tu/Th, 1-2.30p**

Meets with Statistics 131, but graduate students will be exposed to a more rigorous treatment of time series analysis.

Stats 239 **Statistical Sleuthing Through Linear Models** **Lee** **Fall** **Tu/Th, 11.30a-1p**

Meets with Statistics 139, but graduate students will be required to complete additional assignments designed to cover theoretical aspects of regression analysis.

Stats 249 **Statistical Sleuthing Through Generalized Linear Models** **Pillai** **Spring** **M/W, 1-2.30p**

Meets with Statistics 149, but graduate-level covers supplementary topics such as Bayesian analysis for generalized linear models and generalized mixed effect models. Requires extra homework and examination problems in addition to those for Statistics 149.

S-030	**Intermediate Statistics: Applied Regression and Data Analysis**	**Ho**	**Spring**	**Tu/Th, 10-11.30a**

Are scores on high-stakes tests primarily a function of socioeconomic status? Do mandatory seat belt laws save lives? In this HGSE course, students will learn how to use a set of quantitative methods referred to as the general linear model – regression, correlation, analysis of variance, and analysis of covariance – to address these and other questions that arise in educational, psychological, and social research. Using dozens of real data sets as catalysts, we will discuss how to (1) formulate interesting research questions; (2) select appropriate statistical techniques; (3) conduct necessary calculations; (4) examine assumptions necessary for the technique to work appropriately; (5) interpret analytic results; (6) identify rival explanations of the results; and (7) summarize the findings in a cogent and convincing argument. Because quantitative skills are learned best through practice, computer-based statistical analyses will be an integral part of the course.

S-052A, S-052B	**Applied Data Analysis**	**Willett**	**Fall, Spring**	**Check listing**

S-052A (offered in the fall) and S-052B (offered in the spring) are designed for those who want to extend their data-analytic skills beyond a basic knowledge of multiple regression analysis, and who want to communicate their findings clearly to audiences of researchers, scholars, and policymakers. These HGSE courses contribute directly to the diverse data-analytic toolkit that the well-equipped empirical researcher must possess in order to perform sensible analyses of complex educational, psychological, and social data. Topics include more extensive use of transformations in regression analysis, influence statistics, building and comparing taxonomies of regression models, general linear hypothesis testing, an introduction to multilevel modeling, nonlinear regression analysis, binomial logistic regression analysis, principal components analysis, cluster analysis, introduction to discrete-time survival analysis, and others. These are applied courses that offer conceptual explanations of statistical techniques, along with opportunities to examine, implement, and practice them in real data. Learning the computer skills necessary to conduct these kinds of analyses, and the communication skills to discuss them, is an integral part of the courses.

***S-061A1**	**Methods of Educational Measurement (Part I)**	**Koretz**	**Fall**	**M/W, 10a-12p**

This is a two-module HGSE survey course on methods of educational measurement designed for students with prior statistical training. It is designed both for students who need to become critical consumers of test-based information and for those who may apply methods of measurement in their own research. This module will cover traditional psychometric methods (classical test theory) and differential item functioning (DIF), and it will address analytical implications of some current education policies, such as the validity of score gains in high-stakes testing programs. The module will require application of psychometric methods to data from large-scale testing programs.

***S-061A2**	**Methods of Educational Measurement (Part II)**	**Ho**	**Fall**	**M/W, 10a-12p**

This module is the second of two that together constitute a survey course on methods of educational measurement for students with prior statistical training. It is designed to serve students who need to become critical consumers of test scores, students whose work will not focus on measurement but who will need to make appropriate use of test scores, and students whose work may entail a focus on testing. This module will extend from S-061A1 to advanced concepts of measurement, such as generalizability theory, item response theory, scaling, and equating. It will introduce generalizability theory as an extension of classical test theory, overview practical applications of item response theory, and describe the importance of scaling and linking for both test development and the use of accountability metrics. This module will require application of psychometric methods to data from large-scale testing programs.

S-090 **Applied Statistical Analysis with Latent Variables: Path Analysis, Factor Analysis, and Structural Equation Modeling** **Masyn** **Spring** **M/W, 10a-12p**

This HGSE course introduces students to statistical analysis with latent variables, a sophisticated data analytic approach that has become prominent in educational, psychological, and social research. The broad class of latent variable models subsumes many of the more familiar statistical techniques, such as generalized linear regression. However, modeling in a latent variable framework also provides powerful extensions of these basic techniques, leading to more advanced statistical modeling approaches presented in this course, including multivariate regression analysis; path analysis; mediation analysis; confirmatory factor analysis; structural equation modeling; multiple-group modeling; latent growth curve modeling; and multilevel modeling – but with a primary focus on non-nested, cross-sectional, continuous measures. Students will learn to plan, execute, and interpret these select latent variable analyses using the Mplus program. There will be a heavy emphasis on the practical applications of the statistical concepts to address complex substantive research questions, and to that end, there will be several take-home assignments involving data analysis and the interpretation and reporting of research results. Course work culminates for each class member with an original research project of his/her own devising using one or more of the modeling approaches presented during the semester.

S-290 **Quantitative Methods for Improving Causal Inference in Educational Research** **Murnane and Willett** **Spring** **W, 4-7p**

This HGSE course will introduce, explain, and provide practice in using techniques social scientists have developed over the last 30 years for making causal inferences in quantitative research. The course has four major goals: (1) to ensure that participants understand the new methods and their appropriate uses; (2) to demonstrate how these new methodologies can be applied using available software; (3) to show how their application affects research findings on topics such as the impacts of class size, peer groups, and governance structures on student achievement; and (4) to guide class members in making progress on high-quality independent research projects of their own devising.

HPM 299 **Research with Large Databases** **Check listing** **TBD** **TBD**

This course in the School of Public Health addresses potential uses of existing large administrative, clinical, and survey databases to study important questions regarding clinical risk factors, treatment, outcomes and health policy. Strengths and limitations of large databases that are commonly used for research will be considered, and special attention will be devoted to large federal databases that are readily available to new investigators. Practical issues in obtaining, linking and analyzing large databases will be emphasized in the course and key statistical issues will be addressed, including risk-adjustment and sampling weights. Students will evaluate published studies based on large databases and develop a proposal for analyzing a specific research question with a large database.

GENERAL RESEARCH METHODS

COURSE #	TITLE	INSTRUCTOR(S)	TERM	DAY, TIME
Gov 2010	**Strategies for Political Inquiry**	**Hiscox**	**Fall**	**TBD**

Research design for causal inference in qualitative and quantitative studies. Topics covered include measurement, conceptualization, case studies, the relationship between large-n and small-n studies, process-tracing, surveys, field experiments, and natural experiments, with examples of their use in political science.

Psych 1901 (a, b, c, d)	**Methods of Behavioral Research**	**Check listing**	**Fall/ Spring**	**Check listing**

Theoretical and practical introduction to planning, conducting, reporting, and evaluating psychological research. Topics include experimental design, hypothesis generation and testing, experimental artifacts, and analysis of published research.

[Psych 2100	**Research Methodology**	**Hackman**	**Expected to be given in 2011–12**	

*How to conduct empirical research, primarily with human participants. Topics include formulating problems, design strategies, developing and validating concepts, designing and assessing measures and manipulations; issues in data collection, analysis, and interpretation; and publishing findings.***]**

Social Studies 40	**Philosophy and Methods of the Social Sciences**	**Ponniah**	**Spring**	**TBD**

This course integrates research methods with an investigation of the philosophical foundations of the social sciences. Topics covered include causal explanation, interpretation, rational choice and irrationality, relativism, collective action, and social choice.

Soc 128	**Models of Social Science Research**	**Waters**	**Fall**	**M/W, 10-11.30a**

Introduces the methods and logic social scientists use to study the empirical world. Topics include the scientific method, hypothesis testing, measurement of variables, survey research design and sampling, qualitative interviewing, ethnography, experiments, content analysis, GIS, demography, and the ethics of research.

Soc 205	**Sociological Research Design**	**Viterna**	**Fall**	**W, 10a-12p**

This course covers the fundamentals of social science research design. Emphasis is placed on principles that are applicable in all kinds of research, including surveys, participant observation, comparative historical study, and demographic analysis. The course also delves into current methodological controversies in several arenas.

Stats 140	**Design of Experiments**	**Dasgupta/Rubin**	**Spring**	**M/W, 2.30-4p**

Statistical designs for efficient experimentation in physical, chemical, biological, social and management sciences and in engineering. A systematic approach to explore input-output relationships by deliberately manipulating input variables. Topics include analysis of variance, completely randomized and randomized block designs, Latin square designs, balanced incomplete block designs, factorial designs, confounding in blocks, fractional replications, orthogonal arrays, and response surface designs. Each topic is motivated by a real-life example.

HPM 276	**Methods & Applications in Health Services Research**	**Check listing**	**TBD**	**TBD**

This School of Public Health course introduces students to the interdisciplinary field of health services research. The course covers theory, methodology, and applications using a highly interactive teaching approach. Individual sessions will be devoted to research design, analyses of large databases, cost-effectiveness analyses, survey methodology, assessment of health status, assessment of quality, measurement of racial, ethnic, and socioeconomic disparities, appropriateness of care, risk adjustment, and statistical techniques pertinent to health services research. There will be one or more sessions reviewing managerial applications such as case management, use of hospital information systems, and targeting for high-risk patients.

SHDH 245	**Social & Behavioral Research Methods I**	**Gortmaker**	**Fall**	**TBD**

This School of Public Health course provides a broad overview of social and behavioral research methodology, including experimental, quasi-experimental and non-experimental research design, measurement, sampling, data collection, and testing causal theories. By case studies, methodological readings, discussion, written assignments, and data analytic homeworks students learn to conduct social and behavioral research and more applied program evaluations. Homework includes analytic work with observational and experimental studies and development of new measures.