Economic, Political and Policy Sciences

EPPS 6302 Methods of Data Collection and Production (3 semester credit hours) This course introduces data collection and production methods in the big data age. It aims at providing a comprehensive framework in understanding data, and how social scientists conduct research starting from the data generation process. It covers a variety of data production methods from surveys, interviews to experiments, and data collection methods including web data, social media data and complex data. It is designed to equip social scientists with data generation concepts, tools, and best practices. Programming languages include R and Python. (3-0) Y

EPPS 6313 Introduction to Quantitative Methods (3 semester credit hours) This introductory graduate-level statistics course is geared to the consumption of statistical methods commonly used in social science research. Topics include creating and interpreting graphical and tabular summaries of data, descriptive statistics, basic probability theory, sampling distributions, basic hypothesis testing (t-tests, chi-square tests, and analysis of variance), estimation of population parameters, confidence intervals and correlation. An introduction to regression analysis will also be provided. Topics are supported by computer-supported data analyses. (3-0) S

EPPS 6316 Applied Regression (3 semester credit hours) This course provides a survey of the bivariate and multiple regression models estimated using Ordinary Least Squares (OLS), with an emphasis on using regression models to test social and economic hypotheses. This application-focused course presents examples drawn from economics, political science, public policy and sociology, introduces the basic concepts and interpretation of regression models, and basic methods of inference. Topics are supported by computer-supported data analyses. Prerequisite: EPPS 6313 or EPPS 7313. (3-0) S

EPPS 6317 (GISC 6317) Social and Geospatial Science Programming Fundamentals (3 semester credit hours) General introduction to programming language and other techniques for social and geospatial science related applications. Topics covered include fundamental data structures and algorithms, data manipulation and processing, database management, and data analysis. Emphasis is placed on rapid program development with hands-on experience. Students are expected to design and implement a project. Corequisite: GISC 6381 or GEOS 6381 or equivalent with instructor consent required. (3-0) Y

EPPS 6323 Knowledge Mining (3 semester credit hours) This course introduces the concepts and techniques of knowledge discovery, data mining and machine learning. It covers a series of topics starting from exploratory data analysis, unsupervised learning, supervised learning and other learning methods to uncover the patterns and structure of data targeting predictive analytics. Specific modeling methods include regression analysis, classification, logistic models, non-linear models, decision tree, association rules, neural network and support vector machines. Programming languages including Python and R. (3-0) Y

EPPS 6324 Data Management for Social Science Research (3 semester credit hours) Covers the principles and practical techniques of data cleaning, data organization, quality control, and automation of research tasks. Topics covered will include data types, useful text and math functions, labeling, recoding, data documentation, merging datasets, reshaping, and programming structures such as macros, loops, and branching using Stata and R. The course will also discuss using LaTeX to automate outputting of results and graphics in publishable formats. Prerequisite: EPPS 6313 or EPPS 7313 or instructor consent required. (3-0) T
EPPS 6326 (GISC 6323) Machine Learning for Socio-Economic and Geo-Referenced Data (3 semester credit hours) Models and algorithms as well as their underlying conceptional foundations to structure dynamic socio-economic and geo-referenced data are introduced. Open-source software and commonly available hardware are used. Practical examples of [a] supervised machine learning to develop classification rules and [b] unsupervised data mining to uncover a hidden organization of data objects are used to explore the strength and weaknesses of selected data analytical methods and to examine the resulting output. Where appropriate, ethical ramifications are discussed. (3-0) T

EPPS 6342 Research Design II (3 semester credit hours) This course is the second in a two-course sequence devoted to the study of data development strategies and techniques to facilitate effective statistical analysis. Topics generally covered include: the logic of causal inquiry and inference in the Economic, Political and Policy Sciences, the elaboration paradigm and model specification, anticipating and handling threats to internal validity, hierarchies of design structure (experimental, quasi-experimental and non-experimental); linking design structure to effect estimation strategies and analyzing design elements in published literature. Students will be required to select a research topic in consultation with the instructor and prepare a written comparative design analysis. Recommended: EPPS 6310 or EPPS 6316 or equivalent. (3-0) R

EPPS 6346 Qualitative Research Orientation (3 semester credit hours) This course provides a comprehensive understanding of Qualitative Research - its underlying, alternative views of the nature of society and social institutions; placement of the researcher in the research; research methods, including the various main approaches by which to frame, focus, and carry out research - Case Study, Grounded Theory, Phenomenology, Ethnography, and Narrative, along with Content Analysis; benefits and drawbacks of the various approaches; and the scientific contribution of Qualitative Research to social science research, mixed methods research, and public policy. Students are encouraged to relate the research design they create in the course to their qualitative or Mixed Methods dissertation or Masters thesis. (3-0) Y

EPPS 6352 Evaluation Research Methods in the Economic, Political and Policy Sciences (3 semester credit hours) A review of research methods used in program evaluation, with an emphasis on public and nonprofit social programs. Issues to be addressed include research design, appropriate performance standards, measurement and selection of individuals, sampling, data collection, and data analysis. (3-0) T

EPPS 6354 Information Management (3 semester credit hours) This course introduces the database systems including the concepts, design, programming, and management of database systems. It provides training in DBMS and introduces new technologies such as NoSQL and various types of modern database systems. Students will be engaged in database programming and building applications. Programming languages include SQL, Python, HTML, and Dash. (3-0) Y

EPPS 6355 Content Analysis (3 semester credit hours) Content analysis is the art and science of closely studying texts, photographs, videos, and audio soundtracks to extract meanings and other message properties from them. Emphasis is on understanding and applying basic manual and computer-assisted methods, including text mining and semantic analysis, that underpin qualitative and quantitative content analysis research in political science, sociology, economics, public policy, management, and other social sciences. (3-0) T

EPPS 6356 Data Visualization (3 semester credit hours) This course builds data literacy through communicating data patterns, findings and insights via visual representation of data. This course is designed to equip data scientists with data theory, principles and concepts of visualizing data and best practices in visual data analytics. Students will learn the programming tools in generating charts, animated
EPPS 6359 Social Concepts and Measurement (3 semester credit hours) In this course students will learn the fundamentals of social concepts, measurement theory, and sensitivity analysis. We will study and implement methods and technologies for measuring social concepts, including the construction of scales and typologies, latent traits, content analysis, and survey design. For the course project, students will collect and present a new measure of a social concept. This requires students to justify the need to measure the concept on theoretical grounds, to survey the literature for existing measures of the concept, to specify how their measure differs and the logic behind their operationalization, and to collect data according to their operational criteria using an appropriate data collection method. Prerequisites: (EPPS 6313 and EPPS 6316) or (EPPS 7313 and EPPS 7316). (3-0) Y

EPPS 7304 Cost-Benefit Analysis (3 semester credit hours) Examines methods for measuring costs and benefits of public projects and policies, and the application of cost-benefit analysis to areas such as economic development, water resources, recreation, transportation, regulation, and the environment. (3-0) T

EPPS 7313 Descriptive and Inferential Statistics (3 semester credit hours) The course provides a thorough introduction to probability and statistics. Probability topics covered include random variables, expectations, and probability distributions. The heart of the course is a rigorous introduction to statistical inference: sampling theory, confidence intervals, and hypothesis tests. The final section of the course is an introduction to regression analysis, with an emphasis on interpretation of regression results, using examples from recent research. Recommended: one semester of calculus. (3-0) Y

EPPS 7316 Regression and Multivariate Analysis (3 semester credit hours) This course provides a detailed examination of the multiple regression models estimated using Ordinary Least Squares (OLS), with an emphasis on using regression models to test social and economic hypotheses. Also covered are several special topics in regression analysis, including violations of OLS assumptions, the use of dummy variables, and fixed effects models. The course ends with an introduction to advanced topics in regression analysis, qualitative response models, and non-OLS approaches to estimation. Topics are supported by computer-supported data analyses using application-specific software. Prerequisite: EPPS 7313. (3-0) Y

EPPS 7318 Structural Equation and Multilevel (Hierarchical) Modeling (3 semester credit hours) An introduction to structural equation modeling (SEM) and multilevel modeling (MLM), sometimes called hierarchical linear or mixed modeling. SEM represents a general approach to the statistical examination of the fit of a theoretical model to empirical data. Topics include observed variable (path) analysis, latent variable models (e.g., confirmatory factor analysis), and latent variable SEM analyses. MLM represents a general approach to handling data that are nested within each other or have random components. Topics include dealing with two-level data that may be cross-sectional, such as students within classes, or longitudinal, such as repeated observations on individuals, firms or countries. Recommended Prerequisite: Students should have taken an introductory statistics or econometrics course. (3-0) T

EPPS 7344 Categorical and Limited Dependent Variables (3 semester credit hours) This course examines several types of advanced regression models that are frequently used in policy analysis and social science research. The key similarity of these models is that they involve dependent variables that violate one or more of the assumptions of the Ordinary Least Squares (OLS) regression model. The main models examined in the course are binary logit and probit, multinomial logit, ordinal probit, tobit, and the family of Poisson regression models. All these models are estimated using maximum likelihood estimation (MLE). The Heckman correction for selection is also addressed. Recommended: EPPS 6316 or the equivalent. (3-0) T
**EPPS 7368** Spatial Epidemiology (3 semester credit hours) Examines the conceptual and analytic tools used to understand how spatial distributions of exposure impact processes and patterns of disease. Emphasizes the special design, measurement, and analysis issues associated with spatial patterns of diseases. Contemporary diseases of public health importance are addressed, and the statistical and inferential skills are provided that can be used in understanding how spatial patterns arise and their implications for intervention. Prerequisite: **EPPS 6313** or equivalent. (3-0) T

**EPPS 7370** Time Series Analysis I (3 semester credit hours) This course considers several important topics for applied time series analyses of social science and public policy data including the specification and testing of Box-Jenkins ARIMA models and dynamic regressions. Other topics include stationarity and unit root tests, cointegration and error correction models, autoregressive conditional heterogeneity (GARCH) models and introductions to vector autoregression (VAR) and state space models. Students learn how to use modern software such as Eviews, R, RATS and Stata to do time series analyses. Recommended: **EPPS 7316** or equivalent. (3-0) T

**EPPS 7371** Time Series Analysis II (3 semester credit hours) This course introduces intermediate and advanced methods for the analysis of social science time series data. After reviewing core time series concepts such as stationarity and cointegration, the course considers topics such as vector autoregression and vector error correction models, simultaneous equation and structural time series models, regime switching models, non-Gaussian and nonlinear models, and state space representations. Both frequentist and Bayesian approaches to modeling time series processes are employed. Data analyses are implemented using widely available software packages such as R, RATS and Stata. Prerequisite: **EPPS 7370** or instructor consent required. (3-0) T

**EPPS 7386** Survey Research (3 semester credit hours) This course exposes students to the use of survey methods in social science research. Emphasis is placed on interview and questionnaire techniques and the construction and sequencing of survey questions. Attention is also devoted to sampling theory, sampling and non-sampling errors, and the use of recent advances in fieldwork to reduce measurement error in surveys. Recommended: **EPPS 6313** or equivalent. (3-0) T

**EPPS 7390** Bayesian Analysis for Social and Behavioral Sciences (3 semester credit hours) This course covers the theory and application of Bayesian statistics for economic, political, and other social science data. Students will learn how maximum likelihood and Bayesian estimation are related and how the latter is used to develop decision based inference. Topics include subjective probability, general linear models, posterior simulation methods, model specification and averaging, and sensitivity analysis. Prerequisite: **EPPS 7316** or equivalent. (3-0) T

**EPPS 7V81** Special Topics in Social Science Research Methodology (1-9 semester credit hours) May be repeated for credit as topics vary (9 semester credit hours maximum). (3-0) R