Advanced Data Analysis and Advanced Research

**NOT APPROVED AS ADVANCED DATA ANALYSIS**

STA 558 Methods of Data Analysis I – this course is the same as SSW Stats II course.
HSTA 558 Methods of Data Analysis I - this course is the same as SSW Stats II course.
PSY 753 Psychometric Theory and Research – changing format makes this inappropriate for SSW

**The FOLLOWING COURSES ARE APPROVED** – Please refer to the semester schedule classes to identify if the course you are interested in is being offered.

**KEY:**

ADA=meets Advanced Data Analysis requirement
AR=meets Advanced Research requirement

**COLLEGE OF ARTS AND SCIENCES**

**Communications**

**Com 525 Communication Research Methods (3) - AR**
Methods of gathering data and analyzing information common to most communication studies, including political polling and surveys, content analysis, interviewing, measurement, and elementary data analysis.

**Com 587 Field Research Methods (3) - AR**
This course is about data collection and analysis techniques in conducting ethnographic (fieldwork) research in institutional settings. Topics of discussion will include how to collect observational, interview, and documentary data and how to create analytical reports based upon these data. This course will include observation and writing exercises that will give students some practical experience in doing fieldwork-based research. In the context of these exercises, we will discuss important methodological issues about writing fieldnotes, coding fieldnotes, and constructing analytical narratives out of coded data. This course will be offered to graduate students at the master’s and doctoral levels. Doctoral students taking this course will have one or more additional assignments, including writing or revising a proposal for an ethnographic study.

**Economics (Stats courses assume knowledge of calculus)**

**Eco 519 Economic Surveys and Forecasting (3) - ADA**
This course introduces the survey methodology in economics and business for forecasting purposes. Surveys include those of households, experts, and establishments. Topics include: Survey data and methodologies, evaluation of survey data and forecasts, use of survey data in time series modeling techniques for forecasting purposes. Discussion of such important macroeconomic indicators as the leading economic indicators, NAPM index, Diffusion Indices, Consumers sentiment, Price and Industrial Production indices, etc. will be included.
Eco 520 Quantitative Methods I (3) - ADA
Introduction to quantitative methods in economics. Techniques of data analysis, statistical theory, and linear regression are applied to economic problems.

Eco 521 Quantitative Methods II (3) - ADA
Continuation of Eco 520. Econometric extensions of linear regression, forecasting, and methods of analyzing time-series and cross-section data.

Eco 525 Time Series and Forecasting (3) - ADA
This course introduces univariate and multivariate time series models for forecasting in economics. Topics include ARIMA, VAR and GARCH models, unit roots and co-integration, out-of-sample forecasting techniques, model selection, response function analysis and variance decompositions, state space models, various non-linear models, Bayesian approaches and forecast evaluation. Use will be made of case studies and real-life applications in business and finance.

Eco 610 Mathematical Economics I (3) - ADA
Real analysis and linear algebra are developed and applied in optimization theory, comparative statics, and stability analysis in economics. Prerequisites: Two terms of calculus or equivalent.

Eco 620 Econometrics I (3) - ADA
Introduction to econometrics, including the discussion of probability and distribution theory and their use in developing methods of hypothesis testing, parameter estimators, and the regression model.

Eco 621 Econometrics II (3) - ADA
The single equation linear regression model in a matrix algebra context and its application to economic problems. Ordinary least squares, generalized least squares, and other extensions of the standard model. Single equation regression under special conditions and development of the multiple equation linear regression model. Prerequisite: Eco 620 or equivalent.

Eco 720 Econometrics III (3) - ADA
Advanced simultaneous equations estimation and testing procedures; models that use both cross-section and time-series data, varying parameter models; diagnostic tests, model selection and pre-test estimators; non-linear regression models; time-series and distributed lag models; introductory Bayesian methods.

Eco 721 Applied Econometrics (3) - ADA
Application of the single and multiple equation regression models to the estimation and testing of specific economic theories using both micro and macro data; advanced econometric forecasting and business cycle analysis; selected topics of current interest are discussed.
Updated June 2019

**Mathematics**

Mat 554 (H Sta 554) Introduction to Theory of Statistics (3) - ADA
A mathematical treatment of principles of statistical inference. Topics include probability, random variables and random vectors, univariate and multivariate distributions and an introduction to estimation. Appropriate for graduate students in other disciplines and for preparation for the second actuarial examination. Prerequisite: Calculus or linear algebra.

Mat 555 (H Sta 555) Introduction to Theory of Statistics II (3) - ADA
Continuation of Mat 554 (H Sta 554). Topics include methods of estimation, theory of hypothesis testing, sufficient statistics, efficiency and linear models. Appropriate for graduate students in other disciplines and for preparation for the second actuarial examination. Prerequisite: Mat 554 (H Sta 554), Mat 557A or equivalent.

Mat 565 Applied Statistics (3) - ADA
A course in statistical methods for students with some knowledge of statistics. Topics include multiple regression, analysis of variance and nonparametric statistical techniques. Emphasis on data analysis and statistical methodology. May not be taken for credit by students with credit for Mat 308 or 465. Prerequisites: An introductory course in probability or statistics, and some experience with interpretation of data in a subject matter area.

Mat 558 (H Sta 558) Methods of Data Analysis I (3) - ADA
Statistical methodology emphasizing exploratory approaches to data. Elementary notions of modeling and robustness. Overview of inferential techniques in current use. Criteria for selection and application of methods. Use of computing facilities to illustrate and implement methods. Regression and analysis of variance are primary topics. Prerequisite: Mat 554 (H Sta 554) or equivalent.

Mat 559 (H Sta 559) Methods of Data Analysis II (3) - ADA
Continuation of Mat 558 (H Sta 558). Topics will include clustering, multivariate analyses, sequential and nonparametric methods. Prerequisite: Mat 558 (H Sta 558) or equivalent.

Mat 654 (H Sta 654) Probability and Theory of Statistical Inference I (3) - ADA
Univariate and multivariate distribution theory, properties of estimators, large sample theory, confidence intervals and theory of tests. Prerequisite: Mat 555 (H Sta 555) or equivalent.

Mat 655 (H Sta 655) Probability and Theory of Statistical Inference II (3) - ADA
Continuation of Mat 654 (H Sta 654). Advance theory of tests, decision theory and other topics. Prerequisite: Mat 654 (H Sta 654) or equivalent.
Psychology

Psy 510 Statistics and Experimental Methods I (4) - ADA
Basic statistical concepts, applications of the concepts, and an introduction to experimental design in the behavioral sciences. Topics include probability theory, classical null hypothesis significance testing and alternatives, and correlation/regression methods. Introduction to statistical computing with the use of standard software. This is the first course in a two semester sequence along with Psy 511. Prerequisite: Psy 210 or an equivalent course and permission of instructor.

Psy 511 Statistics and Experimental Methods II (4) - ADA
Advanced methods in regression and multiple regression. Analysis of variance techniques associated with experimental methods in the behavioral sciences, and general linear models. Analysis of categorical data and an introduction to non-parametric statistics. Statistical computing applications of these methods with standard software packages.

Psy 608 Research Methods in Social-Personality I (3) - AR
The purpose of this course is to provide an understanding of the basics of hypothesis generation, theory construction measurement theory. Topics include the philosophy of science, the nature of casual argumentation, methods for evaluating theories, theory construction, mathematical modeling and the nature of hypothetical constructs and variables. Measurement of variables are discussed in terms of classic test theory, generalizability theory, latent trait theory, and multiple assessment strategies.

Psy 609 Research Methods in Social-Personality II (3) - AR
This course will cover major methodological approaches in S/P (e.g., observation, experimentation, quasi-experimentation, surveys, etc.), data analytic issues that are unique to S/P, distinctions between basic and applied research in S/P, and between S/P and the other social sciences. In addition, this course will cover issues related to professional development, such as the scholarly presentation of results, journal writing, and manuscript submission.

Psy 613 Multivariate Analysis (3) - ADA
An overview of multivariate statistical methods as they pertain to psychological research. Techniques discussed include multiple regression; multivariate analysis of variance; discriminant analysis; principal components; canonical correlation; factor analysis; cluster analysis.

Psy 614 Meta-Analysis (3) - ADA
Covers such substantive issues as: rationale for meta-analyses; estimation of study effect size; combining results of experimental studies; combining results of correlational studies; moderator variable analysis. Prerequisites: Psy 510 and 511 or equivalents.

Psy 736 Research Methods in Psychology (3) - AR
Introductory, graduate-level treatment of a variety of research-related issues germane to psychology and closely related disciplines. The topics considered include the scientific method, elements of the research process, alternative strategies for operationalizing variables, sampling, psychometrics, experimental research, non-experimental research, research artifacts and non-traditional research. Prerequisite: Psy 510 or equivalent.
**Psy 737 Research Methods in Social and Personality Psychology (3) - AR**
Research methodology including correlational and experimental techniques along with coverage of test construction, survey methods, field studies, and laboratory experimentation. Special topics include response sets, demand characteristics, and ethical issues. Prerequisite(s): Psy 510 and Psy 511 or consent of instructor.

**Psy 753 (Hpm 753) Psychometric Theory and Research (3) - AR**
Major emphasis on classical and modern measurement theories and their applications. Includes psychological construct measurement, scale construction, and recent developments such as Item Response Theory. Prerequisite: Graduate status.

**Sociology**

**Soc 509 Research Methods (3) - AR**
Theory construction and verification, use of statistics in social research, qualitative research techniques, sampling, measurement, data collection and analysis, policy research, and use of computer in research. A research paper is required. Prerequisite: Admission to graduate study or consent of instructor.

**Soc 535 Qualitative Research Techniques (3) - AR**
Participant observation, interviewing, analysis of personal documents, sociological inferences from literature and arts, and sociological use of historical sources. Prerequisite: Admission to graduate study or consent of instructor.

**Soc 552 Demographic Techniques (3) - ADA**
Overview of basic methods and data sources for the analysis of demographic processes. Topics include measures of fertility, mortality and migration, life tables, demographic standardization, population estimates and projections, and stable and stationary populations.

**Soc 609 Multivariate Analysis (3) - ADA**
A detailed exposition of the "general linear model," including ordinary and generalized least squares solutions. Multi-equation models will also be covered.

**Soc 622 Selected Topics in Multivariate Analysis (3) - ADA**
Covers one or more advanced topics in multivariate statistical methods, including logit/probit models, log-linear models, structural equation models, LISREL, factor analysis, time-series analysis, and event history analysis. Prerequisite: Soc 522 or consent of instructor.

**Soc 626 Survey Design and Analysis (3) - ADA**
Conceptualization, design, execution, and analysis of large-scale surveys.

**SOC 666 Selective Topic: Understanding and Analyzing Longitudinal Data – ADA**

**SOC 666 Analysis & Interpretation in Qualitative Studies – ADA**
The course is a graduate level introduction to qualitative data analysis. The course views qualitative research as a multi-stage process, and we focus upon the processes involved in focusing our research and, through analysis, turning our observational notes and interview transcripts into credible sociological accounts. The course presumes that students have had an introductory course in qualitative methods, preferably SOC 535.

**COLLEGE OF COMPUTING AND INFORMATION**

**Department of Informatics**

**Inf 710 Research Design in Information Science (4) - AR**
Students will examine research issues in information science at an advanced level, focusing on appropriate research design, data gathering techniques and analysis relating to data collection and measurement. Students will explore the research design process from both qualitative and quantitative points of view.

**Inf 787 (Com 587) Field Research Methods (3) - AR**
This course is about data collection and analysis techniques in conducting ethnographic (fieldwork) research in institutional settings. Topics of discussion will include how to collect observational, interview, and documentary data and how to create analytical reports based upon these data. This course will include observation and writing exercises that will give students some practical experience in doing fieldwork-based research. In the context of these exercises, we will discuss important methodological issues about writing fieldnotes, coding fieldnotes, and constructing analytical narratives out of coded data. This course will be offered to graduate students at the master's and doctoral levels. Doctoral students taking this course will have one or more additional assignments, including writing or revising a proposal for an ethnographic study. Prerequisites: Pad 704 or Inf 710 are required of doctoral students registering for Inf 787.

**SCHOOL OF CRIMINAL JUSTICE**

**Crj 592: Data Utilization - ADA**
This course will teach the basics of quantitative data file construction, cleaning, documentation, and use. This is a hands-on computer course where students will learn proper techniques for managing simple datasets. They will also learn how to use SPSS for data management and documentation. Students will apply their technical skills to major criminal justice data collections to learn how the technical and substantive skills are complementary.

**Crj 682 Research Design in Criminal Justice I (3) - AR**
Development of research design of the kind most useful to criminal justice problems, construction of descriptive systems for qualitative analysis; use of various data collection methods including observation, development of interview schedules, questionnaire construction and sociometric devices, questions of validity and reliability.
CRJ 687 Statistical Techniques in Criminal Justice Research II (4) (Doctoral Students) - ADA
Introduction to multivariate analysis of cross-sectional data. Techniques include multi-way contingency tables, partial and multiple correlation and multiple regression analysis, analysis of variance and covariance, analysis of qualitative dependent variables, and data reduction using weighted and unweighted additive scales. The use of the computer for data analysis will be an integral part of the course. (CRJ Stats I a prerequisite)

Crj 689 Research in Action Settings (4) - AR
Analysis of the social scientist's role in development, implementation, and evaluation of research activities in criminal justice settings; nature of negotiations between research and action staff in planning, implementation, and monitoring data analysis and feedback of findings; protection of the integrity of the research design analysis of strains on organization and persons in action settings; use of research findings to encourage social change. Students work in a field setting in order to develop and implement a research project.

Crj 690 Statistical Techniques in Criminal Justice Research III (3) - ADA
Topics vary from year to year and may include one or more of the following; design and analysis of longitudinal research; time series analysis; categorical data analysis including log-linear, logit, logistic regression, discriminant analysis, and probit analysis models; or structural equation (LISREL) models. The course may be repeated for credit when topics change. The use of the computer for data analysis will be an integral part of the course. Prerequisite: specific prerequisites may vary depending on the topics covered in the course, but one course in multivariate analysis at the level of Crj 687 is recommended.

Crj 691 Program Evaluation (3) - AR
Systematic review of efforts to evaluate intervention programs and assess effectiveness of crime prevention schemes and methods for the treatment of offenders, both in ongoing operations and under experimental conditions. The use of prediction techniques and other forms of matching and operational research methods, with special reference to problems of criteria and measurements of effectiveness or performance. Students should have some familiarity with multivariate statistical methods before taking this course.

Crj 692 Data Utilization in Criminal Justice (4) - ADA
This course will cover the essentials of quantitative data file construction, documentation, transfer, manipulation, storage, and management. Topics include building both rectangular and hierarchical data files using various types of programs and formats. This includes matching and merging data files. Special attention will be paid to issues surrounding the management of longitudinal data files including security, time ordering of events for analysis, data storage, weighting of stratified data, and post-stratification weighting for attrition. The logic, mechanics, and implications of various mechanisms for imputing missing data will be covered.

Crj 697 Qualitative Research in Criminal Justice (3) - ADA or AR (can’t take for both requirements)
This course covers the basics of collecting, analyzing, and writing up qualitative data. It is designed for those who want to employ or incorporate qualitative methods in their own research as well as
for those wishing to gain a deeper understanding of how qualitative research is produced and evaluated. We will focus primarily on ethnographic field research and in-depth interviewing, although we will review other methods such as conversation analysis, autobiographies and life histories, and case studies.

CRJ 710 Longitudinal Data Analysis in Criminological Research (3) - ADA
This is an advanced seminar course on the theory and methods for longitudinal data analysis. Topics covered include fixed effects, first difference models, latent growth curves, latent class models, group based trajectory models, and a brief introduction to growth mixture modeling pending available time. This seminar will involve theoretical treatment of the covered topics, but the focus will be upon empirical applications with an emphasis upon methods.

SCHOOL OF PUBLIC HEALTH

BioStatistics (Stats courses assume equivalent to bachelors degree in mathematics)

Sta 554 (Mat 554) Introduction to the Theory of Statistics I (3) - ADA
A mathematical treatment of principles of statistical inference. Topics include probability, random variables and random vectors, univariate and multivariate distributions and an introduction to estimation. Appropriate for graduate students in other disciplines and for preparation for the second actuarial examination. Prerequisites: Calculus and linear algebra.

Sta 555 (Mat 555) Introduction to the Theory of Statistics II (3) - ADA
Continuation of Sta 554. Topics include methods of estimation, theory of hypothesis testing, sufficient statistics, efficiency and linear models. Appropriate for graduate students in other disciplines and for preparation for the second actuarial examination.

Sta 556 (Mat 556) Introduction to Bayesian Inference I (3) - ADA
Topics include subjective probability, axiomatic development and applications of utility, basic concepts of decision theory, conjugate and locally uniform prior distributions.

Sta 558 (Mat 558) Methods of Data Analysis I (3) - ADA
Statistical methodology emphasizing exploratory approaches to data. Elementary notions of modeling and robustness. Overview of inferential techniques in current use. Criteria for selection and applications methods. Use of computing facilities to illustrate and implement methods. Regression and analysis of variance are the primary topics.

Sta 559 (Mat 559) Methods of Data Analysis II (3) - ADA
Continuation of Sta 558. Topics will include clustering, multivariate analyses, sequential and nonparametric methods.

Sta 560 (Mat 560) Introduction to Stochastic Processes I (3) - ADA
An introduction to applied stochastic processes. Topics include Markov chains, queuing theory, renewal theory, Poisson processes and extensions, epidemic and disease models. Prerequisite: Sta 555 or an introductory probability course.

Sta 561 Introduction to Stochastic Processes II (3) - ADA
Continuation of Sta 560. More advanced topics in Markov chains, queuing theory, Poisson processes and extensions, epidemic and disease models. Prerequisite: Sta 560 or permission of the instructor.

Sta 562 (Mat 562) Design of Experiments I (3) - ADA
Principles in the design and analysis of controlled experiments. Topics include general linear hypotheses, multiple classifications, Latin squares and factorial designs. Prerequisite: Sta 555 or equivalent.

Sta 564 (Mat 564) Sample Survey of Methodology I (3) - AR
Principles of survey sampling and analysis. Topics include simple random sampling, stratified sampling, cluster sampling and multistage sampling. Prerequisite: Sta 555 or equivalent.

Sta 565 Sample Survey Methodology II (3) - AR
Continuation of Sta 564. Topics include more complex designs in stratified sampling, cluster sampling and multistage sampling. A introduction to cost studies, nonsampling errors and miscellaneous topics. Prerequisite: Sta 564 or equivalent.

Sta 566 (Mat 566) Analysis of Categorical Data I (3) - ADA
Introduction to the analysis of categorical data. Topics include rates, ratios and proportions, relative risk, Cochran-Mantel Haenszel procedures, linear and log-linear models for categorical data, maximum likelihood estimation and tests of hypotheses.

Sta 568 (Mat 568) Statistical Ecology (3) - ADA
Density estimates for closed and open populations using simple and multiple marking methods. Mortality and survival estimation, population dynamics. Spatial patterns in one and two-species populations. Characterization of many-species populations. Prerequisite: Sta 555 or equivalent.

Sta 570 Topics in Evaluation (3) - ADA
Selected topics in experimental design, data collection instruments, registries, outcome measures, assessment of agencies and/or programs and qualitative and quantitative methodologies used in evaluation. Prerequisite: Consent of instructor.

Sta 610 Statistical Analysis with Missing Data (3) - ADA
The overall goal of this course is to develop a broad and thorough working knowledge of the missing data techniques at a practical, conceptual and mathematical level. The students are expected to gain hands-on experience applying these techniques in many settings commonly encountered in public health and biostatistics. Prerequisites: Data Analysis I and II; Mathematical Statistics or with instructor’s permission.

Sta 654 (Mat 654) Probability and Theory of Statistical Inference I (3) - ADA
Univariate and multivariate distribution theory, properties of estimators, large sample theory, confidence intervals and theory of tests.

Sta 656 Design of Clinical Trials (3) - AR
Introduction to topics in the design and analysis of clinical trials and related experiments.

Sta 660 (Mat 660) Linear Models I (3) - ADA
Topics include the theory of least squares, distribution of quadratic forms, G-inverse, general Gauss-Markov model, estimation, hypothesis tests, confidence intervals for unrestricted and restricted models, regression models and analysis of variance. Prerequisite: Sta 555 or equivalent.

Sta 661 Linear Models II (3) - ADA
Continuation of Sta 660. Topics include advanced analysis of variance and analysis of covariance, repeated measures, mixed and random models.

Sta 662 (Mat 662) Multivariate Analysis I (3) - ADA
Topics include the basic properties of multivariate normal distributions and other related distributions, inference in multivariate cases and principle component analysis. Prerequisite: Sta 555 or the consent of the instructor.

Sta 664 (Mat 664) Time Series Analysis I (3) - ADA
Topics include the study of inference, estimation, prediction, parsimonious description for univariate time-ordered data, various models including Box-Jenkins and classical stationary processes with rational spectral densities.

Sta 666 Survivorship Analysis I (3) - ADA
Topics in survival functions, hazard rates, life tables, estimation of survival functions from complete and censored data, fitting parametric models, tests of hypotheses, and covariate models.

Sta 667 Survivorship Analysis II (3) - ADA
Continuation of Sta 666. Advanced topics in the theory of survival functions for complete and censored data, tests of hypotheses, and time dependent covariate models.

Epidemiology

Epi 501 Principles and Methods of Epidemiology I (3) - AR
Introduction to epidemiology for students majoring in any aspect of public health; covers the principles and methods of epidemiologic investigation including describing the patterns of illness in populations and research designs for investigating the etiology of disease. Introduces quantitative measures to determine risk, association and procedures for standardization of rates.

Epi 502 (Ant 517) Principles and Methods of Epidemiology II (3) - AR
Application of basic principles and methods (as covered in Epi 501 and Sta 552) in the design and conduct of epidemiologic studies. Topics include the development of research questions; overview of epidemiologic study designs; sampling, sample size, and selection bias; techniques for data collection, sources of secondary data, and the evaluation of measurement and information bias;
confounding and effect modification; techniques for simple and stratified analyses; and an introduction to mathematical modeling in epidemiology. Prerequisite(s): Epi 501, Sta 552 or their equivalents.

**Epi 514 (Hpm 514) Computer Programming for Data Management and Analysis in Public Health (3) - ADA**
The course covers a major statistical computer program (e.g. SAS) used for the management, analysis and reporting of public health data. Topics include, how to access data stored in a variety of formats; techniques for identifying errors and outliers in data sets; combining data from multiple sources into a single data file; calculating statistical and epidemiologic measures; and report writing.

**Epi 612 Quantitative Methods in Epidemiology (4) - ADA**
Application of the concepts introduced in Sta 552 and Sta 553 to the analysis of epidemiological studies. Topics include: simple and stratified analyses of cross-sectional, case-control, cumulative follow-up, and density follow-up studies; matching in epidemiologic studies; logistic regression; theoretical considerations, analysis strategy, and applications.

**Epi 701 Advanced Quantitative Methods for Epidemiology (3) - ADA**
The course covers quantitative methods used in epidemiologic studies. The course will focus on statistical modeling of epidemiologic data, including survival data analysis, categorical data analysis and regression analyses currently utilized in epidemiologic studies.

**Health Policy, Management, and Behavior**

**Hpm 647 Program Evaluation (3) - AR**
Provide students with a basic understanding of and skills in the uses and principles of evaluation models and methodologies. The course will provide an overview of evaluation, evaluation models, evaluation design methodology, principles of sampling, principles of measurement and data collection, the application of qualitative and quantitative analysis tools to evaluation data, as well as methods for enhancing the likelihood that evaluation results are utilized. Both quantitative and qualitative models and methods will be discussed.

**Hpm 652 Quantitative Methods in Health Policy (3) - ADA**
Students are introduced to a variety of statistical methods and problems encountered by health policy analysts, planners and administrators. Quantitative methods for solving these problems and journal articles provide real-world examples for students. Methods include: nonparametric statistical methods; medical and health policy decision analysis; quantitative methods for health policy analysis.

**Hpm 753 (Psy 753) Psychometric Theory and Research (3) - AR**
This course familiarizes the student with theories and practices relevant to the development and use of psychosocial measures in basic and applied research. Rationale for the utilization of different strategies in the development and analysis of particular measures will be discussed.
Environmental Health Sciences

Ehs 612 GIS and Public Health (2) - ADA
This class will explore how public health practitioners and researchers can use geographic information systems (GIS) for interpretation and communication of spatial data. Using ESRI's ArcGIS software package and other GIS programs, students will learn to use GIS to integrate, manage, analyze and display public health data spatially to help with hypothesis generation, hypothesis testing and visual display of information. The course will employ case studies from varied public health fields to help illustrate the theoretical concepts and mapping tools covered in class.

THE ROCKEFELLER COLLEGE OF PUBLIC AFFAIRS AND POLICY

Public Administration

Pad 504 (Pub 504) Data, Models, and Decisions I (4) - ADA or AR (can’t take for both requirements)
Introduction to computer-based tools for planning, policy analysis, and decision making. Topics include administrative and policy models in spreadsheets, dynamic models in difference equations and spreadsheets, making decisions with multiple criteria, resource allocation, probability and decision trees, data bases and information management, and telecommunications in local networks and the Internet.

Pad 505 (Crj 504, Pos 505, Ssw 504) Data, Models, and Decisions II (4) - ADA or AR (can’t take for both requirements)
A case-based approach to methods of data collection, statistical modeling, and analysis particularly appropriate to problems in public management and policy. Topics include case studies of data modeling and decisions in the public sector, data collection, exploratory data analysis, population and sampling distributions, confidence intervals, hypothesis testing, correlation, and regression.

Pad 517 (Pos 517) Empirical Data Analysis (4) - ADA
Introduction to a variety of data-analysis techniques ranging in complexity from simple table construction and interpretation to causal analysis. Within this range are coding, scale and index construction, multidimensional scaling, levels of measurement, measures of association, correlation and regression, panel and cohort analysis, and Markov chains. Introduction to computer technology and functional software. Basic competence in statistics necessary. Prerequisite: One course in statistics or consent of instructor.

Pad 518 (Pos 518) Regression Analysis (4) - ADA
This course will give students familiarity with multivariate regression analysis, including Ordinary Least Squares and other regression methods. Prerequisites: Pos 517 or Pad 505 or Pub 505 or equivalent

Pad 519 (Pos 519) Advanced Statistical Methods (4) - ADA
The course will give students familiarity with advanced statistical techniques currently used by
political scientists. Topics may include a) advanced regression analysis; b) time series regression; c) categorical data analysis; d) maximum likelihood estimation; and e) other statistical techniques. Prerequisites: Pos 517 or Pad 505 or Pub 505 or equivalent

**Pad 621 Quantitative Methods in Public Administration (4) - ADA**
General introduction to the use of principal analytical methods in the making of administrative decisions. May include special topics in operations research, decision theory, or multivariate statistical analysis (e.g., multiple regression, factor analysis, cluster analysis). Typical applications of quantitative analysis and the development of models rather than on computational techniques. Prerequisites: One year of college mathematics and Pad 505 or equivalent.

**Pad 622 Methods of Public Policy Analysis (4) - AR**
Application of quantitative methods to current public policy problems. A term project, conducted in teams and involving the use of quantitative methods is required. Involves reading and discussions of philosophy and methodology, class presentations of projects in process, interim written progress reports, and a final project report. Goals are the policy-analytic experience itself and increased sophistication in the application of qualitative methods. Prerequisites: At least two 600-level courses in policy analysis methods.

**Pad 624 (Itm 624) Business Dynamics: Simulation Modeling for Decision-Making (3-4) - ADA or AR (can’t take for both requirements)**
Explores the use of computer models to understand, diagnose, and experiment with organizational policy and design options. Students will learn about simulation-based analysis, employ a simulation tool, and apply their knowledge to problems of current importance. Prerequisites: Itm 520, Itm 522, or Pad 504 or consent of the instructor. (can be either Advanced Data or Advanced Methods course).

**Pad 626 Evaluation of Public Sector Programs (4) - AR**
The practice of program evaluation in the public sector is the focus of this course. Topics covered include both quantitative and qualitative evaluation methods, data collection, conduct of evaluation in an organizational setting, and utilization of evaluation results.

**Pad 628 Readings in Research Methodology (4) - AR**
Individual directed reading programs in selected topics and problems of research methodology.

**PAD 636 Advanced Qualitative Analysis (4) AR**
This course explores a variety of approaches to the analysis of qualitative data. These approaches cover a range of perspectives on qualitative research. Students will develop skills in interviewing, observation, coding, case study development, grounded theory analysis, and reporting results. Students will complete assignments and a research project involving the practice of these skills.

**Pad 670 (Pos 670) Research Methods in Historical Institutionalism (4) - AR**
This class will introduce students to research methods in historical institutionalism, an approach to studying policy and government that has swept through the Social Sciences. Doctoral students will have an opportunity to learn about the research process and work on an in-depth piece of original research.
Pad 724 Simulation for Policy Analysis and Design (3-6) - ADA or AR (can't take for both requirements)
Continued development of topics treated in Pad 624, Simulating Dynamic Systems, stressing advanced concepts in the formulation of feedback simulations of social systems. Organized around a single paper that requires students to formulate and construct a dynamia model for a public policy problem. *(can be either Advanced Data or Advanced Methods course).*

Pad 748 Quantitative Analysis in Public Finance (4) - ADA
Emphasizes current policy problems in the field of public finance and the methodology of applying quantitative techniques to the analysis and solution of these problems. Possible topics include: the role of regression analysis in property assessment, the determinants of local government expenditures, the fiscal impact of grants-in-aid, cost-benefit or cost-effectiveness analysis, and revenue estimate techniques. Open to all doctoral candidates and advanced master's candidates with the consent of the instructor.

**Political Science**

**Pos 517 (Pad 517) Empirical Data Analysis (4) - ADA**
Introduction to a variety of data-analysis techniques ranging in complexity from simple table construction and interpretation to causal analysis. Within this range are coding, scale and index construction, multidimensional scaling, levels of measurement, measures of association, correlation and regression, panel and cohort analysis, and Markov chains. Introduction to computer technology and functional software. Basic competence in statistics necessary.

**Pos 518 (Pad 518) Regression Analysis (4) - ADA**
This course will give students familiarity with multivariate regression analysis, including Ordinary Least Squares and other regression methods.

**Pos 519 (Pad 519) Advanced Statistical Methods (4) - ADA**
The course will give students familiarity with advanced statistical techniques currently used by political scientists. Topics may include a) advanced regression analysis; b) time series regression; c) categorical data analysis; d) maximum likelihood estimation; and e) other statistical techniques.

**Pos 618 Qualitative Methods (4) - AR**
This course examines qualitative research and how it fits in the broader discipline of political science. It covers the contributions and limitations of qualitative research; the nuts and bolts of conducting qualitative research; and how to analyze the results. Prerequisites: Pos 516, Pos 517 or equivalent.

**Pos 670 (Pad 670) Research Methods in Historical Institutionalism (4) - AR**
This class will introduce students to research methods in historical institutionalism, an approach to studying policy and government that has swept through the Social Sciences. Doctoral students will have an opportunity to learn about the research process and work on an in-depth piece of original research.
SCHOOL OF EDUCATION

Educational Administration and Policy Studies

Aps 614 Quantitative Methods in Educational Leadership (3) - ADA
Introduction to the basic methods of quantitative analysis for leadership and management in educational settings. Topics include methods for description, modeling, forecasting, inference, and presentation of data relevant to monitoring, assessment, and planning in education. Includes use of spreadsheet and other analytical tools.

Aps 662 Survey Research Methods (3) - AR
The course provides an introduction to modern survey methodology through current literature and links to in-practice surveys that offer an overview of both the theoretical and practical aspects of survey research. Students practice developing questions, designing questionnaires and conducting mini-small-scale surveys. Particular attention is paid to decision-making processes in designing a survey as well as to research in cognitive psychology that informs questionnaire development. Beyond designing and conducting survey research, the course covers organizing data, interpreting results and writing reports.

Aps 714 Introduction to Research Methods in Educational Administration and Policy Studies (3) - AR
The course introduces students to the broad range of approaches to doing research in EAPS. It surveys research methods and designs applicable to topics in educational administration, decision making, and policy analysis with emphasis on how to choose effective methods and the consequences of those choices.

Aps 715 Research Practicum in Educational Administration and Policy Studies (3) - AR
Designed to provide the student with experience in actual research design and conduct concerning administrative and policy study areas and issues. The final product will be a 20- to 30-page research prospectus, which may subsequently provide background for the student's dissertation proposal. Prerequisite: Aps 714. This course is only open to students who have passed the departments comprehensive exam.

Aps 762 Seminar in Advanced Research Methods for Educational Leadership (3) - AR
Special topics seminar on advanced or specialized research methods in the study of education policy and organizational leadership. Topics will vary each semester, but will draw on the instructor’s expertise with applying cutting-edge data collection or analysis techniques to the study of educational institutions and systems. Students may repeat this course as the topic changes. Prerequisite: Permission of instructor.

Counseling Psychology

Cpy 724 Regression Analysis for Counseling Research (3) - ADA
Introduction to bivariate and multiple regression analysis in counseling research including bivariate correlation and regression, partial and semi-partial correlation, multiple regression, and correlation, tests of hypotheses, and regression diagnostics. Prerequisite: E Psy 630 or equivalent.
Cpy 725 Multivariate Applications in Counseling Psychology (3) - ADA
Applications of multivariate methods in counseling psychology. Emphasis on the applications of the general linear model and related topics to the analysis and interpretation of data typically encountered in counseling psychology research. Mastery of available computer programs for analyzing such data will be a central topic.

Cpy 726 The Analysis of Covariance Structures (3) - ADA
This course focuses on the measurement and analysis of unobservable latent variables. The analysis of covariance structures (structural equation modeling) encompasses a wide variety of statistical models that combine the psychometric and statistical traditions of confirmatory factor analysis and linear model path analysis on the latent variables that result therefrom. Prerequisites: Cpy 724 (or equivalent), Psy 630 (or equivalent).

Cpy 767 Research Principles and Methods in Counseling (3) - AR
Enables students to consume research literature and apply it in the field. Included in the course will be: concepts of research design, critiquing of research literature, application of research findings for counselors in rehabilitation settings, schools, and community agencies. Prerequisite: undergraduate coursework in statistics. Required of all doctoral students.

Educational Psychology

EPsy 633 Nonparametric and Distribution-Free Statistics (3) - AR
Designed to familiarize the student with nonparametric and distribution-free statistics. Methods and techniques that have broad utility for social science research (i.e., education, sociology, and psychology.) Application, particularly, to binomial or related distributions. Prerequisite: E Psy 530 or its equivalent.

EPsy 640 Educational and Psychological Measurement (3) - ADA
Principles and concepts of measurement; validity and reliability of tests; norms; standardized tests of aptitude and achievement; measures of interests and other personality traits.

EPSY 645: Item Response Theory (3) - AR
Students will be introduced to the field of item response theory (IRT) with the aim of becoming successful research practitioners in IRT. With that aim in mind students will (1) gain familiarity with various IRT models, and (2) be able to apply and interpret these models appropriately. The course will begin with the classic dichotomous IRT models, their estimation and proper interpretation. Polytomous models will be introduced, as well. Students will also be able to assess model fit, detect differential item functioning, and understand instrument design and adaptive testing within the context of IRT. Examples from both education and psychology will be used throughout the course.

EPSY 732 Single Case Design and Analysis (3) - ADA
This course is designed to help students gain a working understanding of methods used to design, analyze and meta-analyze single-case research data (i.e, small-n, interrupted time series,
intrasubject, N=1, single-subjects), the assumptions underlying these methods, and the limitations of these methods. We will consider visual analyses, structured visual analyses, randomization tests, non-overlap statistics, regression based methods and corresponding effect size indices, and hierarchical linear modeling. For each of these methods, students will learn to: (1) Read, paraphrase, and evaluate the analyses of others, (2) Plan meaningful analyses for specific single-case studies, (3) Articulate rationales for the planned analyses, (4) Conduct the analyses, using statistical software when appropriate (5) Communicate the results of the analysis. Prerequisite: E Psy 630.

E Psy 751 Multivariate Methods for Applied Researchers and Evaluators (3) – ADA & AR
Selected topics dealing with the selection, interpretation, and communication of findings that result from using multivariate methods in applied research and evaluation. Emphasis on determining appropriate methods of analysis, documenting and communication these needs, and interpreting the analyses in client/lay language. Pre-requisite: E Psy 630 or equivalent; and E Psy 750 (either prior to or concurrently) or equivalent.

EPSY 771 Multivariate Methods for Applied Researchers and Evaluators (3) - ADA
Selected topics dealing with selection, interpretation, and communication of findings that result from using multivariate methods in applied research and evaluate. Emphasis determining appropriate methods of analysis, documenting and communication of these needs, and interpreting the analyses in client/lay language. Pre-requisite EPSY 630 or equivalent and EPSY750 or equivalent.

Educational Theory and Practice

Tap 680 Research Seminar: Critical Introduction to Educational Research Paradigms (3) - AR
This course focuses on the different models and paradigms in educational research and how these paradigms can inform educational practice. It will involve critical reading of published exemplars of different paradigms, analyzing previously collected data, and making sense of the application of these data.

Tap 681 Research Seminar: Research in Practice (3) - AR
This course focuses on action (teacher) research. The theory and practice of action research will be examined through a review of the theoretical foundations of educational research and its link to the improvement of educational practice. Students will design and implement a small action research project in their own setting.

Tap 740 Principles of Program Evaluation (3) - AR
Approaches to the evaluation of curricular and instructional aspects of demonstration projects and on-going programs. Problems in instrumentation, analysis, and reporting of product and process evaluations at formative and summative stages.

Tap 741 Advanced Issues in Methodology I (3) - AR
Survey of advanced issues in the design of research evaluation and measurement with emphasis on the appropriate selection and use of these techniques in applied settings. Problems and issues
related to selection, application and communication of methodology stressed. Prerequisite: Tap 740, E Psy 530, or permission of instructor.

**Tap 743 Meta-Analysis and Literature Review in Educational Research (3) AR**
Examines strategies for literature review as a systematic scholarly activity. Articulates strategies appropriate for different types of literature review and promotes critical examination of published reviews. Critically examines approaches to literature review that are sensitive to the probabilistic nature of research findings. Meta-analytic techniques are reviewed with guided experiences in application.

**Tap 777 Qualitative Research Methods (3) - AR**
Qualitative research methods and issues with focus on ethnographic techniques; participant observation and interviewing: analyzing, interpreting, and collecting data. Attention to problems generic to fieldwork; emphasis on formation of research questions (entry into field settings, ethical issues in fieldwork, qualitative analysis and theory building).

**Tap 778 (Rdg 778) Qualitative Research Field Methods (3) - ADA**
Focuses on data interpretation and representation. Frameworks for analyzing and interpreting data are examined with emphasis on both theoretical perspectives and practical applications. Forms of representation are emphasized as a critical aspect of knowledge generation. Prerequisite: Tap 777 or consent of instructor.

**School of Social Welfare**

**RSSW 705 Participatory Action Research (3) - AR**
The community as the client and context of practice, models and methods of practice, and types of purposive change treated descriptively and analytically. Emphasizes the proliferation of self-help organizations and their relationship to more traditional services.