

Course Descriptions:
Graduate Certificate Program in Data Visualization and Analysis

Visualization and Cognition

DAVA 7000 Data Visualization

Visualization is crucial for understanding complex information and for enabling humans to act on information appropriately. For example, visualization is used in many application areas such as social and health sciences, business, the natural sciences and engineering. This course introduces the foundations of information visualization rooted in cognitive psychology and perception. This course also teaches retrieving information from data sources, such as data bases and the internet, preparing data for processing, as well as creating and presenting information visualizations using standard software. Co-requisite: PSYC 7214 . *3 credits*

PSYC 7124 Cognition for Visualization

Visualization students will be challenged to apply the basic research findings of cognitive psychology to the problem of the visual representation of data. Basic knowledge about how our perception, attention, and memory work, as well as how we reason and make decisions, has implications for how we should summarize and present data to facilitate understanding and discovery. The operations of the mind, which are the topic matter of cognitive psychology, are so ubiquitous that they are difficult to address and even notice. A common experience of students of cognitive psychology is that by questioning and reflecting upon simple everyday activities, much of your ordinary mental life begins to seem quite extra-ordinary. For instance, reading this sentence involves perception, attention, language comprehension, and, hopefully, some kind of critical reflection on its contents. You will soon be in a position to appreciate that the feats accomplished by your mind on a normal basis are both more marvelous and more mysterious than any current computer animation or the most sophisticated special effects in movies. It is testament to your mind's success that its surprisingly complex operations are typically unconscious and thus remain unnoticed. In order to query its mechanisms we will thus have to adopt a specific mode of investigative curiosity that combines intuitions, speculative hypotheses, and empirical evidence (gained by several methodological approaches) in order to develop, refine and test scientific theories. This course examines research on human and some animal cognitive processes, including perception, attention, memory, concept formation, reasoning, decision-making, and problem-solving. The course will give you an overview of past and current research and theory in cognitive psychology, a basic understanding of the empirical methods used, and an understanding of the ways in which knowledge of these processes has been applied to real-world problems and to improve the quality of life. *3 credits*

Data Analysis

DAVA 6010 Data Mining

This course introduces the foundations of applied data mining. There is a need for extracting useful information from raw data in fields such as social and health sciences, business, the natural sciences and engineering. This course covers the fundamental ideas and algorithms of data mining. Furthermore, it teaches applying data mining techniques in order to extract useful information from data. Standard software for data mining will be used. The course is intended for any student desiring an introduction to data mining. Prerequisites: B.A. or B.S. undergraduate degree with GPA of at least 2.75. *3 credits*

PSMA 6002 Research Methods and Statistical Analysis

Introduces both quantitative and qualitative research methodologies. Topics include descriptive and inferential statistics, issues in sampling and hypothesis testing, analysis of variance, regression and time series analysis, as well as survey design. Computer software is used for statistical analysis. 3 credits

Alternatives to PSMA 6002:

CHEM 6212 Statistics and Applied Analytical Chemistry

Principles of experimental design, statistics and analysis of data. Principles of data acquisition and interpretation and other aspects of applied analytical chemistry. 3 credits

GMHS 7500+5708

GMHS 7500 Intermediate Statistical Methods I

Part I - Nature of statistics. This is the first part of a two part course sequence. The following topics are covered: descriptive statistics, graphical methods, measures of central tendency and variability, probability, correlation and regression. The SPSS Statistical Analysis package will be used throughout the course. 3 credits

GMHS 7508 Intermediate Statistical Methods II

Part II - Nature of statistics. This is the second part of a two-part course sequence. The following topics are covered: sampling distributions, inferential statistics, estimation and hypothesis testing, tests of independence and nonparametric statistics. The SPSS Statistical Analysis package will be used throughout the course. 3 credits

PSYC 6100+6200

PSYC 6100 Research Design and Analysis I

This first of two courses in research design and analysis. Students will develop an understanding of basic statistical theory and research design with special emphasis on research designs that use analysis of variance (NOVA) and relate analysis. Students will learn to choose the appropriate statistical techniques for a range of situations, and compute the statistics both by hand and with standard statistical software packages. 3 credits

PSYC 6200 Research Design and Analysis II

The second of two courses in research design and analysis. This course introduces students to basic behavioral science research in psychology, with special emphasis on research designs that use various types of regression analyses. The course will help students read, understand, and interpret published literature as well as translate their ideas into practical research designs. Prerequisite: PSYC 6100. 3 credits

Practical Experience

DAVA 8011 Intern in Visual Analytics

This course provides credit for students participating in an internship experience through the Career Center. As part of the requirements, students are required to give a presentation about their experience in the departmental seminar. Students interested in the internship experience are required to consult the departmental internship adviser. Prerequisites: DAVA 7000 and PSYC 7214 are prerequisites with an average 2.5 GPA on each. DAVA 6010, and PSMA 6002 (or equivalent) are co-requisites. 3 credits

DAVA 8021 Project in Visual Analytics

Students participate in a project in visualization and data analysis under the guidance of a faculty member in the Departments of Mathematics and Computer Science. The topic of the project is closely integrated with the learning experience in the prerequisite course on visualization and in the co-requisite courses on data mining and on statistics. The topic is chosen in consultation with faculty guiding the project. Prerequisites: DAVA 7000 and PSYC 7214 with an average 2.5 GPA on each. DAVA 6010, and PSMA 6002 (or equivalent) are co-requisites.

Elective Courses

COGR 6323 Presentation Graphics

This course introduces students to the communication of information through visual symbols, including charts and graphics. Presentation, business and information graphics are taught within the context of professional and ethical standards using professional systems and software. 3 credits

COST 7220 Effective Presentations

This class features a broad study of speaking and listening skills within corporations, and public and governmental agencies. Topics include: building a professional image, nonverbal code systems, corporate strategies and tactics, formal and informal speaking situations, preparation and delivery of spoken messages, analysis of speech qualities and improvement of individual speaking skills. 3 credits

EDST 6215 Computer Graphics

Create, manipulate, and enhance graphic images suitable for printed publications, electronic presentations, and multimedia applications including Web pages with Microsoft Image Composer. Plan and design animated images using Microsoft GIF Animator bringing all learned knowledge together by creating Macromedia Flash movies. 3 credits

EDST 6304 Production I: Visual Communication Design

An introduction to visual communication that provides students with the needed skills to design, produce, practice, and present creative products utilizing a variety of electronic media. The importance of developing visual literacy through practice in interactive media, print, video, digital photography and presentation will be a focus. From typography and layout to color and composition, an array of design elements will be explored in relationship to constructing a clear channel of communication for maximizing student learning. 3 credits

GMHS 7604 Survey Design in Health Care

The primary focus of this course is on development a survey instrument. Theoretical and practical issues related to the development, validation and implementation of research surveys will be addressed. Key issues include: question construction, questionnaire design, validating and piloting a new survey and survey data collection methods. 3 credits

Prerequisite in Psychology

PSYC 1101 Introduction to Psychology

Survey of the major content areas of psychology, including physiological, perception, motivation, learning, cognition, personality, developmental, abnormal and social. 3 credits