PSY-2150: QUANTITATIVE METHODS IN BEHAVIORAL SCIENCE

Cuyahoga Community College

Viewing: PSY-2150 : Quantitative Methods in Behavioral Science

Board of Trustees:
May 2024

Academic Term:
Fall 2024

Subject Code
PSY - Psychology

Course Number:
2150

Title:
Quantitative Methods in Behavioral Science

Catalog Description:
Introduction to quantitative analysis of behavioral data. Application of descriptive and inferential statistics (including correlation, t-test, and ANOVA) and SPSS computer software to data presentation, hypothesis testing, and design and interpretation of behavioral research. This course integrates mathematical concepts in psychological research that assumes a working understanding of basic algebra.

Credit Hour(s):
4

Lecture Hour(s):
3

Lab Hour(s):
2

Requisites

Prerequisite and Corequisite
PSY-1010 General Psychology or PSY-101H Honors General Psychology, or departmental approval.

Outcomes

Course Outcome(s):
Explain the role of statistics in social science research.

Essential Learning Outcome Mapping:
Written Communication: Demonstrate effective written communication for an intended audience that follows genre/disciplinary conventions that reflect clarity, organization, and editing skills.

Objective(s):
1. Describe the research process and the scientific method.
2. Distinguish between different types of quantitative research, and for each type describe how statistics are used in the operationalization of variables and evaluation of hypotheses.
3. Discusses specific challenges associated with social science research as compared to research in other discipline.
4. Distinguishes between qualitative and quantitative research.

Course Outcome(s):
Plan a social science study.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Draw an appropriate research sample.
2. Evaluate research measures.
3. Anticipate and correct threats to research validity.

Course Outcome(s):

Describe social science data sets accurately and effectively.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Computes descriptive statistics and creates graphs.
2. Discuss the purposes of data description and the use of various statistics to achieve these goals.
3. List available descriptive statistics, their strength and their limits.

Course Outcome(s):

Apply univariate and simple multivariate statistical methods to test hypotheses in social science research.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. Explain logic of hypothesis testing in social science research.
2. Choose appropriate statistical methods on the basis of knowledge of function, assumptions, strength and limits of statistical methods
3. Uses computer software for computations and can read the program output.

Course Outcome(s):

Interpret and evaluate statistical findings, in both his/her own research and results presented in social science research journals, in terms of their implication for social science theories and facts.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.
Information Literacy: Acquire, evaluate, and use information from credible sources in order to meet information needs for a specific research purpose.

Objective(s):

1. Relate statistical results to the research questions and hypotheses.
2. Discuss the limits of findings.

Course Outcome(s):

Succeed in more advanced courses in research methods and statistics.

Objective(s):

1. Discuss the mathematical basis for statistical methods, in particular probability as it applies to statistics, probability distributions and the derivation of basic statistical formulas.
2. Describe the names and functions of frequently-used advanced statistical methods not taught in this course.

Methods of Evaluation:

1. Exams and quizzes
2. Problem sets, homework assignments that involve data description and hypothesis testing
3. Projects, papers and reports that involve class research or secondary analysis of existing data sets
4. Computer-based analysis of data, reports based on computer print-outs
5. Oral presentation of analysis of data sets

Course Content Outline:

1. The uses of statistics in behavioral science research
   a. Inferential versus descriptive statistics
   b. Relationships in behavioral science, correlation versus experiments
2. Description of data
   a. Variables, measurement, levels of measurement, graphic representation
   b. Frequency distributions, percentiles, and standard scores measures of central tendency, variability, and distribution shape
3. Introduction to statistical inference
   a. Computing probability
   b. The normal curve and z distribution
   c. Populations, samples and sampling
   d. Sampling distributions
   e. The logic of hypothesis testing
4. Types of hypotheses
   a. Estimates and confidence intervals
   b. Means from two samples
   c. Paired means
5. Correlation and linear regression
   a. Measures of association
   b. Inferences about associations
   c. Linear regression with one predictor variable
6. Analysis of variance
   a. One way ANOVA
   b. Two way ANOVA
7. Hypotheses about proportions and the chi-square
8. Statistics and research design In the behavioral sciences
   a. Power
   b. Effect size
   c. Correlational studies versus experiments versus quasi-experiments
9. Computer software
   a. Data entry and transformation
   b. Creating graphs and charts
   c. Data analysis specifications
   d. Reading output

Resources

Gravetter, F. J., & Wallnau , L. B. *Statistics for the behavioral sciences*. 10th ed. Beverley, MA: Wadsworth, 2016.

Aron, A., Aron, E. N., & Coups, E. J. *Statistics for psychology*. 6th ed. Upper Saddle River, NJ: Pearson, 2012.

Howell, D. C. *Statistical methods for psychology.* 8th. Belmont, CA: Cengage Learning, 2012.

Field, A. *Discovering psychology using SPSS*. 6th. London:Sage, 2024.

Keppel, G., Wickens, T. D. *Design and analysis: A researcher's handbook.* 4th. Upper Saddle River, NJ: Prentice Hall, 2004.

Millsap, R. E., Maydeu-Olivares, A. *The SAGE handbook of quantitative methods in psychology.* London:Sage, 2009.

Cooper, H. et. al. *APA handbook of research methods in psychology, Vol 2: Research designs: Quantitative, qualitative, neuropsychological, and biological*. 2nd ed. Washinton, D.C: APA, 2023.

Jackson, S. L., Griggs, R. A. *Teaching statistics and research methods: Tips from ToP.* Washington, D.C.: Society for the Teaching of Psychology, 2012.

Morgan, G. A.., et al. *IBM SPSS for introductory statistics: Use and interpretation*. 6th ed. New York: Routledge/Taylor & Francis Group, 2019.

Shadish, W.R., Cook, T. D., Campbell, D. T. *Experimental and quasi-experimental designs for generalized causal inference.* 2. Beverley, MA: Wadsworth., 2001.

Cohen, J., Cohen, P., West, S. G., Aiken, S. G. *Applied multiple regression/correlation analysis for the behavioral sciences.* 3rd. New York: Routledge Academic, 2002.

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"Psychological Bulletin"

"Journal of Educational and Behavioral Statistics"

Resources Other

- Stats Soft Electronic Statistics Textbook: http://www.statsoft.com/textbook/chaid-analysis/?button=1
- Trochim, William M.K., T*he Knowledge Base -- An Online Research Methods Textbook*, 2024. http://www.socialresearchmethods.net/kb/
- Gary McClelland. Seeing Statistics (http://www.seeingstatistics.com/), Dusbury Press. 1999. http://www.seeingstatistics.com/
- Statistics at Square One--T D V Swinscow Revised by M J Campbell. http://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one (http://www.bmj.com/about-bmj/resources-readers/publications/statistics-square-one/)
- HyperStat Online Statistics Textbook. http://davidmlane.com/hyperstat/

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