

APPLIED RESEARCH AND STATISTICS

SYLLABUS

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Written & Delivered By:



PEREGRINE

— GLOBAL SERVICES —

ACADEMICS • LEADERSHIP • PUBLICATIONS

APPLIED RESEARCH AND STATISTICS

Overview

Applied research projects in industry and in higher education are typically structured around a research approach that includes a topic, problem statement, research questions, hypotheses, statistical testing, and analysis of the results. Quantitative, case study, and mixed methods research approaches typically follow this scientific method for research. The purpose of this module is to teach the scientific methodology for applied research and the use of statistics for hypothesis testing.

Learners

This module is designed for anyone involved in applied research including thesis students, doctoral students, and applied researchers.

The module may qualify for Continuing Education Units (CEU) for professional certifications depending on the professional association.

Module Authors

The author for this module is Peregrine Global Services headquartered in Gillette Wyoming. Peregrine Global Services. Peregrine's team members include personnel who have taught at the doctoral level and who have conducted applied research.

Learning Outcomes

The learning outcomes for the module are as follows. With the completion of this module, learners will be able to:

1. Understand the types of applied research and the use of statistics in applied research.
2. Know how to use a data analysis tool pack and add-ons in Excel.
3. Know how to use the basic functions in Excel.
4. Know the basic statistical terminology.
5. Calculate and report descriptive statistics for a data set.
6. Select the correct inferential statistical test based on the nature of the data and the analysis required.

7. Understand the meaning of the term significance.
8. Use a statistical table.
9. Create a problem statement based on a research topic.
10. Create a hypothesis pair based on the problem statement.
11. Perform a Chi-square test.
12. Perform a Spearman's Rank Correlation test.
13. Perform a t-Test.
14. Perform an ANOVA test.
15. Perform a MANOVA test.
16. Perform a Regression test.

Curriculum

<u>Section</u>	<u>Topics / Subtopics</u>
Section 1: Applied Research	<ul style="list-style-type: none"> • Welcome to Applied Research & Statistics Video • Use of Statistics in Applied Research • Types of Research • Determining Which Statistical Test to Use • Understanding Validity and Reliability
Section 2: Analysis Tool Pack	<ul style="list-style-type: none"> • Real Statistics Analysis Tool Pack • How to Download and Install the Real Statistics Analysis Tool Pack Video • How to Load and Use your Excel Analysis Tool Pack Video • Excel Analysis Tool Pack
Section 3: Excel Review	<ul style="list-style-type: none"> • Using Excel • An Overview of Excel Video • Advanced Features of Excel
Section 4: Statistical Terminology	<ul style="list-style-type: none"> • A Statistical Glossary • Statistical Terms and Topics Video

	<ul style="list-style-type: none"> • Understanding Statistical Terminology
Section 5: Descriptive Statistics	<ul style="list-style-type: none"> • Descriptive Statistics • Variables • Measures of Central Tendency • Standard Deviation • Calculating Descriptive Statistics in Excel Video
Section 6: Inferential Statistics	<ul style="list-style-type: none"> • Statistical Tests • How Inference Works • Statistical Significance • Type I and Type II Errors • Using a Statistical Test
Section 7: Understanding Significance	<ul style="list-style-type: none"> • The Meaning of the Term Significant Video • Probability (p) Values
Section 8: Using and Reading Statistical Tables	<ul style="list-style-type: none"> • What is a Statistical Table? • How to Use Statistical Tables Video • Determining Significance from a Statistical Table
Section 9: From Topic to Problem Statement	<ul style="list-style-type: none"> • How to Write a Problem Statement based on a Topic
Section 10: From Problem Statement to Research Questions	<ul style="list-style-type: none"> • How to Write Research Questions based on a Problem Statement
Section 11: From Research Questions to Hypotheses Pair	<ul style="list-style-type: none"> • How to Write a Hypothesis Pair based on a Problem Statement
Section 12: Chi-square Test	<ul style="list-style-type: none"> • Understanding and Using Chi-square Tests • Reporting Chi-square Results • Exercise 1 Video • Exercise 2
Section 13: Spearman's Rank Correlation Coefficient	<ul style="list-style-type: none"> • Understanding and Using Spearman's Rank Correlation Coefficient • Reporting Spearman's Rank Correlation Results • Exercise 1 Video • Exercise 2
Section 14: t-Tests	<ul style="list-style-type: none"> • Understanding and Using t-Tests • Reporting t-Test Results • Exercise 1 Video

	<ul style="list-style-type: none"> • Exercise 2
Section 15: ANOVA	<ul style="list-style-type: none"> • Understanding and Using ANOVA • Reporting ANOVA Results • Exercise 1 Video • Exercise 2
Section 16: MANOVA	<ul style="list-style-type: none"> • Understanding and Using MANOVA • Reporting MANOVA Results • Exercise 1 Video • Exercise 2
Section 17: Regression	<ul style="list-style-type: none"> • Understanding and Using Regression • Reporting Regression Results • Exercise 1 Video • Exercise 2
Section 18: Statistical Test Selection	<ul style="list-style-type: none"> • Statistical Test Section Quiz Video
Section 19: Assessment	<ul style="list-style-type: none"> • Final Exam

References and Additional Readings

Getting Started:

This website provides several examples and illustrations of the research process.

<https://www.scribbr.com/research-process/>

The website provides descriptive statistics as well as a number of inferential statistical tests for data sets, an online statistical calculator. <http://www.socscistatistics.com/Default.aspx>

The following resource provides extensive reference material as well and enhancements for using Microsoft Excel for statistical analysis. <http://www.real-statistics.com>

Books:

Adams, K. A., & Lawrence, E. K. (2014). *Research methods, statistics, and applications*. Singapore: SAGE Publishing. 978-1-4522-2018-5.

Gaultney, J. F., & Peach, H. D. (2016). *How to do research: 15 labs for the Social & Behavioral Sciences*. Singapore: SAGE Publishing. ISBN: 978-1-4833-8512-9.

Jackson, S. L. (2016). *Research methods and statistics: A critical thinking approach* (5th ed.). Jacksonville University. ISBN: 978-1-305-25779-5.

Martin, W. E., & Bridgmon, K. D. (2012). *Quantitative and statistical research methods: From hypothesis to results*. Jossey-Bass. ISBN: 978-0-470-63182-9.

Newsome, B. O. (2015). *An introduction to research, analysis, and writing practical skills for Social Science students*. Singapore: SAGE Publishing. ISBN: 978-1-4833-5255-8.

Videos:

Cec Ugc [Thakur, M. N.]. (2013, Jul 2). *Research methodology: Introduction* [Video file]. Retrieved from https://youtu.be/IzLn9_PA_4s This Lecture talks about Research Methodology.

Cec Ugc [Wali, O. P.] (2012, Oct 30). *The use of statistics in research method* [Video file]. Retrieved from <https://www.youtube.com/watch?v=myc6W-n6Su0> This Lecture talks about the use of statistics in research method.

ChrisFlipp [Chris Flip]. (2014, Jan 15) *Qualitative vs. quantitative* [Video file]. Retrieved from <https://youtu.be/2X-QSU6-hPU?list=PLkOAJ4SpMApSS6pfWeM7JWbO-C80VtMYO> Let's go on a journey and look at the basic characteristics of qualitative and quantitative research!

Fugin, C. [Caspo Fugin]. (2013, Jun 24). *Research methodology; Lecture 1 (mini course)* [Video file]. Retrieved from https://youtu.be/9IjScfF_irU Organizer: Krishna Vedula | Presenter: Prasant Mohapatra, Professor, Computer Science, University of California at Davis. From the series of 8 Lectures for Research Methodology, GTU PhD Programme.

Gramenz, G. [Gary Gramenz]. (2013, May 15). *Into to research methodology* [Video file]. Retrieved from <https://youtu.be/1LGuNn9Q0bI> Research Methods. An introduction to research methodology.

OtaruShodai [Shawn Clankie]. (2012, May 24). *A brief comparison of qualitative and quantitative research methods* [Video file]. Retrieved from <https://youtu.be/LYqDKEsy9gE> Filmed at the Otaru University of Commerce Sapporo Satellite on May 16, 2012. Taught by Professor Shawn Clankie and assisted by Tatsuya Mima. It is very helpful to use James Neill's handout that can be found at <http://wilderdom.com/research/QualitativeVersusQuantitativeResearch.html>

TAMUC DrDawg. (2011, Aug 20). *RESEARCH 1 - 5 - Differences in quantitative and qualitative research* [Video file]. Retrieved from <https://youtu.be/DxFuw22bPnE> This podcast examines similarities and differences in quantitative and qualitative research.

Yale University [Leslie Curry]. (2015, Jun 23). *Fundamentals of qualitative research methods: What is qualitative research (module 1)* [Video file]. Retrieved from https://youtu.be/wbdN_sLWI88 Qualitative research is a strategy for systematic collection, organization, and interpretation of phenomena that are difficult to measure quantitatively. Dr. Leslie Curry leads us through six modules covering essential topics in qualitative research, including what is qualitative research and how to use the most common methods, in-depth interviews and focus groups. These videos are intended to enhance participants' capacity to conceptualize, design, and conduct qualitative research in the health sciences.

Websites:

Explorable - Statistics Tutorials <https://explorable.com/statistics-tutorial>

International Journal of Business Communication (may require subscription).

<http://job.sagepub.com/> International Journal of Business Communication (IJBC), peer-reviewed and published quarterly, provides rigorous original research that contributes to the knowledge and theory of business communication.

Journal of Business Continuity & Emergency Planning.

<http://www.henrystewartpublications.com/jbcep> Journal of Business Continuity & Emergency Planning is the leading professional journal publishing peer-reviewed articles and case studies written by and for business continuity and emergency managers.

Kristopher J. Preacher's faculty page at Vanderbilt University. <http://quantpsy.org/> Interactive calculators, mediation material, moderation material, and supplemental material including SPSS and SAS macros, LESREL, Mplus, and Mx syntax, and example data.

National Centre for Research Methods. <http://www.ncrm.ac.uk/> The NCRM Explore site allows the login and the receipt of customized research methods content. The site also offers better ways to search for research methods content, better ways to find relevant training courses and events and it will keep track of your custom search results to make future searches more effective.

RefWorks. <http://www.refworks.com/> This is an online research management, writing and collaboration tool designed to help researchers easily gather, manage, store and share all types of information, as well as generate citations and bibliographies.

Social Psychology Network <https://www.socialpsychology.org/methods.htm>

Statistical Associates Publishing. <http://www.statisticalassociates.com> Numerous topics in both quantitative and qualitative research methods. Each topic provides information on key concepts, assumptions, frequently asked questions, and a bibliography. Many of the quantitative topics include examples using SPSS.

Statistical Methodology- The Official Journal of the International Indian Statistical Association
<http://www.journals.elsevier.com/statistical-methodology/> ISSN: 1572-3127.

StatPages. <http://statpages.org/> Over 600 links to webpages that perform statistical calculations (interactive stats); free software; books, journals, and manuals; demonstrations and tutorials; and resources for statistical computation. The downloadable software packages include, but are not limited to: OpenStat, Vista, PSPP, OpenEpi, Statext, Microsir, Gnumeric, Statist, Tanagra, Dap, PAST, Instant Plus, WinIDAMS, and SSP.

The Visual Learner. <http://lc.gcumedia.com/hlt362v/the-visual-learner/the-visual-learner-v2.1.html> The website provides visual help and videos on statistics including definition of terms for both quantitative and qualitative studies along with demonstrations of types of calculations such as linear regression and probability.

VassarStats: Website for Statistical Computation. <http://vassarstats.net/> Free tutorials, articles, and calculators for statistical computation on probability, distributions, categorical frequency data, ordinal data, correlation/regression, t-tests, and analysis of variance/covariance.

Delivery

The module is delivered using Peregrine's Learning Management System (LMS) known as CMAD. Course instruction is with asynchronous online learning activities.

Module Assessment

Throughout the module, there are in-progress quizzes and short exercises to ensure understanding of the instructional content.

A course completion certificate is issued when the learner obtains at least 80% on the final exam, which includes at least one question based on each learning outcome.

Hours and Articulation

Learner hours for the module are shown in the following table. The hours are based on both the time within the module and time away from the module conducting application activities.

<u>Section</u>	<u>Hours</u>
Section 1: Applied Research	1
Section 2: Analysis Tool Pack	1
Section 3: Excel Review	1
Section 4: Statistical Terminology	1
Section 5: Descriptive Statistics	1
Section 6: Inferential Statistics	1
Section 7: Understanding Significance	1
Section 8: Using and Reading Statistical Tables	1
Section 9: From Topic to Problem Statement	1
Section 10: From Problem Statement to Research Questions	1
Section 11: From Research Questions to Hypotheses Pair	1
Section 12: Chi-square Test	2
Section 13: Spearman's Rank Correlation Coefficient	2
Section 14: t-Tests	2
Section 15: ANOVA	2
Section 16: MANOVA	2
Section 17: Regression	2
Section 18: Statistical Test Selection	0.5
Section 19: Assessment	0.5
Total Learner Contact Hours	25