

Spring 2026 HAP602 Statistics in Health Services Management

- **Instructor**

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- **Course descriptions**

This course focuses on descriptive and inferential statistics with applications of various statistical techniques to health services management to help students better understand basic statistics concepts and its applications in the field of health services management, health policy and administration. Topics include sampling, measures of central tendency and dispersion, probability distributions, hypothesis testing, analysis of variance, correlation, linear regression, and nonparametric approaches.

- **Course Competencies**

This course is based on a set of MHA Competencies and Learning Objectives. Students are expected to gain a targeted level of proficiency in each of the Competencies.

- **MHA competencies**

A selected set of the MHA Competencies is the basis for the design of this course, including course content; learning objectives; and teaching and assessment methods. For each competency, faculty identify a “Targeted Proficiency Level”, which students are expected to attain. Course assessments are designed to measure student progress in attaining one of the following targeted proficiency levels. (See Appendix C: Proficiency Level Definitions)

Course Competencies: HAP 602	
Competency	Level

<p>1.5 Management Reporting</p> <p>Management Reporting and how clinical outcomes, quality, patient/workforce safety, finance and management statistics and reports inter-relate.</p> <p>[Management reporting can be siloed, offering only a look into a particular area (i.e., finance, safety, outcomes, etc.). Successful leaders can integrate the findings from each area, understand their interdependence, prioritize, and develop multidisciplinary recommendations/solutions].</p>	<p>Beginner</p>
<p>2.1 Communicate Effectively</p> <p>Communicate effectively, by tailoring information, whether written or oral, to an intended target audience. Written and oral communication should be clear and concise, using appropriate slides, charts and/or graphs, as necessary.</p> <p>[Most industries have their own `language` and healthcare is no different. Communications must be developed for the specific audience. Clinicians use different terminology than CEOs. Finance language is different than human resources. Communication must be crafted in a manner to be understood by the recipient, in the way intended by the presenter\author. Communication may be intended to influence, educate, update, etc. All require different levels/types of detail, support, and composition].</p>	<p>Intermediate</p>
<p>3.2 Quantitative Reasoning & Problem Solving</p> <p>Quantitative Reasoning/Problem-solving skills, utilizing appropriate analytical techniques and methods, to generate recommendations that are financially feasible, politically implementable, and supported by reliable and valid information, while identifying potential risks.</p> <p>[Critical thinking and problem-solving skills are critical to almost any leadership, or</p>	<p>Advanced</p>

<p>leadership support role. Understanding where to look for information, how to research, drill down into data, support assumptions, etc. is a requirement. Knowledge of and ability to use tools/processes such as Root Cause Analyses (RCA) and Situation Background, Assessment, Recommendation (SBAR), are technical expectations].</p> <p>[Understand primary and secondary research and how /when to attribute].</p>	
<p>3.3 Performance Improvement Analysis</p> <p>Performance Improvement Analysis skills and use of quantitative and qualitative improvement analysis to improve outcomes, safety, and operational performance.</p> <p>[The goal of continuously improving performance is a constant. The ability to identify opportunities for improvement and recommending corrective actions is a critical skill].</p>	<p>Beginner</p>

- **Textbook and materials**

[Salkind NJ. \(2021\). Statistics for People Who \(Think They\) Hate Statistics: Using Microsoft Excel \[5th edition\] \(*required*\)](#) – Students are encouraged to read assigned chapters in advance of classes. MS Excel 365 (or any versions 2016 or later) – available through GMU account (*required*) Laptop – encouraged to bring your own laptop to the class.

- **Student assessment**

- 2 **article assignments** (5 points each, due in Weeks 3 & 10)

Each individual student will read assigned peer-reviewed articles to critically assess statistical techniques used in the articles and will provide written responses to a set of questions based on concepts from lectures.

The purpose of this article assignment is to apply statistical concepts learned in class and critically assess: (1) a research question being tested in an article; (2) data and statistical method used, (3) if statistical test results are properly presented, and (5)

policy implications that how this health-related issue can be addressed with public policies.

More details appear at the end of syllabus (Appendix A).

- **2 data analysis assignments** (5 points each, due in Weeks 9 & 11)

Each individual student will analyze quantitative data sets to provide written responses to a set of questions based on concepts from lectures.

- **Midterm** (20 points, due in Week 6)

Each individual student will provide answers to a set of questions based on statistical concepts from lectures.

- **Final exam** (20 points, due in Week 14)

Each individual student will provide answers to a set of questions based on statistical concepts from lectures.

- **Individual presentation** (40 points, due in Week 14)

Students will prepare final presentations on health policy-related issues (e.g. obesity, smoking, disparities in access to care). Students will analyze secondary data sets (e.g. county-level health ranking data, National Health Interview Survey, American Community Survey) using statistical techniques learned from lectures and Microsoft Excel program.

Individuals will submit (1) research questions (Week #8), (2) statistical methods (Week #10), (3) preliminary empirical results (Week #12), (4) discussion & literature review (Week #13), and (5) presentation slides (Week #14). Students will receive feedback for each submission.

The purpose of this presentation assignment is to apply statistical concepts learned in class and analyze a real-world data set to provide: (1) a research question that is based on hypotheses and literature review; (2) an introduction section that defines the problem and gives evidence supporting reasons why the selected issues matter from society's perspective, (3) data and statistical method descriptions, (4) statistical test results that show whether the null hypotheses can be rejected, and (5) a conclusion section with policy implications that how this selected issue can be addressed with public policies.

More details appear at the end of syllabus (Appendix B).

- **MPH Competencies for CEPH**

Utilize statistical methods to aid in health policy and management decisions (article

assignment).

- **Grading scale**

A+: 97 – 100

A: 93 – 96

A-: 90 – 92

B+: 87 – 89

B: 83 – 86

B-: 80 – 82

C: 70 – 79

F: 0 – 69

- **Zero tolerance policy**

Cheating or plagiarism related to academic work will be subject to university-level case reviews and will result in F grades (see Mason honor code).

- **Use of Artificial Intelligence (AI) Tools**

AI tools, such as ChatGPT or Gemini, can be valuable to enhance learning. However, their use must align with principles of academic integrity, intellectual honesty, and the development of critical thinking skills; and it should follow the fundamental principles of GMU's Academic Standards policies. Below are allowable and prohibited uses of AI tools for this course.

- * **Allowable Uses of AI Tools**

Research Assistance: AI may help identify relevant academic articles on a paper topic of your interest, but you must verify and cite the original sources yourself. You could also query AI health policy contexts (e.g., asking for an overview of the Affordable Care Act). You may use AI tools to re-explain key concepts, definitions, or methods covered in class (e.g., degrees of freedom).

- * **Prohibited Uses of AI Tools**

(1) **Generating Final Work or Substantial Portions of the Assignments:** Submitting AI-generated text, tables, figures, or analyses as if it were your own work is prohibited. Do not copy-paste an AI-produced essay, literature review, or exam answer. In particular, original

work is required for the final paper. The learning objectives for the final paper require students to demonstrate skills and practices that they can reliably perform without supplemental tools.

(2) Bypassing Assigned Readings: Do not use AI to summarize articles, policy reports, or research papers in place of doing the assigned reading yourself.

(3) Fabricated References: You may not use AI to create bibliographies, as AI tools sometimes invent sources. All references must be verified from real academic or policy literature.

(4) Fabricating Data: You cannot use AI to create fictitious datasets or statistics

(5) Exams and Quizzes: AI use is prohibited on all quizzes, exams, and class assessments.

*** Disclosure Requirement**

Use of AI-generated text without proper attribution is a violation of academic integrity.

If you use AI tools in any part of your assignment (beyond grammar/spelling correction), include a statement on AI use describing which AI tool you used, and what you used it for.

*** Ethical Considerations**

Work produced with the aid of Generative AI is not without risk. AI tools can produce biased, inaccurate, or hallucinated information, especially in nuanced fields like health economics and policy where diverse views exist. You are responsible for the accuracy and ethical implications of your work. Use of these tools on any assignment not specified will be considered a violation of the academic standards policy. All academic standards violations will be reported using the [Academic Standards Referral Form](#).

Course Schedule

- **Week 1 (Jan. 23)**

Reading: Chapter 8

Course introduction

Syllabus review

Fundamental concepts

Samples and populations, Sampling

Hypothesis testing

- **Week 2 (Jan. 30) – ONLINE ASYNCHRONOUS**

Reading: Chapter 8 & Chapters 2 – 4 (if you need Excel refresher)

Measurement scales

Measures of central tendency and variability

- **Week 3 (Feb. 06)**

Reading: Chapters 11 – 13

Standard normal distribution

Z-scores

Single-sample Z-test

Two-sample T-test

Assessment: Article assignment #1

- **Week 4 (Feb. 13) – ONLINE ASYNCHRONOUS**

Reading: Chapter 7

Reliability & validity

- **Week 5 (Feb. 20)**

Reading: Chapter 10

Type 1 & 2 errors

Sample size calculation

Confidence interval

- **Week 6 (Feb. 27)**

Assessment: Midterm exam

- **Week 7 (Mar. 06)**

Reading: Chapters 6, 16, 17

Correlation

Simple linear regression

- **Week 8 (Mar. 13)**

NO CLASS (Spring recess)

- **Week 9 (Mar. 20) – ONLINE ASYNCHRONOUS**

Reading: Chapters 14

Analysis of variance (ANOVA)

Assessment: Data analysis assignment #1

- **Week 10 (Mar. 27)**

Reading: Chapter 15, 19

Linear regression (cont.)

ANOVA (cont.)

Factorial analysis of variance

Assessment: Article assignment #2

- **Week 11 (Apr. 03) – ONLINE ASYNCHRONOUS**

Reading: Chapter 18

Nonparametric tests

Assessment: Data analysis assignment #2

- **Week 12 (Apr. 10)**

Reading: External reading

Binomial distribution

- **Week 13 (Apr. 17)**

Independent working session

- **Week 14 (Apr. 24)**

Assessment: Presentation due

Assessment: Final exam

Appendix A. Article Assignment Grading Rubric

Criteria	Average – Good (revision is needed) (0 to 0.5 point)	Excellent (meeting or exceeding expectation) (0.6 to 1 point)
Research question (1 point)	There is an unclear articulation of the hypotheses to be tested.	A student is able to understand research question, and to clearly identify the variables to be used.
Literature review (1 point)	It is not clear that a student understands how this research contributes to the field.	A student can clearly illustrates previous study done in the field around the topic, and understand how this study will play a role in expanding the knowledge of the field.
Statistical methods (1 point)	It is not clear that a student fully understands both the method and the data characteristics.	A student fully understands both the method and the data characteristics.
Data presentation (1 point)	A student fails to interpret statistical results presented in the study.	A student properly interprets statistical results presented in the study. And a student uses information in tables and graphs correctly.
Discussion (1 point)	A student fails to assess whether the test results are consistent with literature. And a student cannot articulate policy implications that are supported by data are provided.	A student can assess whether the test results are consistent with literature. And a student properly articulate policy implications that are supported by data are provided.

Appendix B. Presentation Grading Rubric

Criteria	Average – Good (revision is needed)	Excellent (meeting or exceeding expectation)
Hypothesis (research question) (8 points)	The research question is not able to be studied using statistical approaches as written, or there is an unclear articulation of the variables to be studied.	Research question is well-articulated, the question lends itself to formal statistical analysis, and the variables to be used are clearly identified.
Literature review (8 points)	The literature review fails to show evidence of research in the literature, or it does not make the case for this study. Often, this quality of literature review provides only anecdotal support for the study. May not use a broad set of articles (fewer than 3).	Literature review clearly illustrates previous study done in the field around the topic, and the review highlights how this study will play a role in expanding the knowledge of the field.
Statistical methods (8 points)	Justification of method is absent or weak. Method is inconsistent with the data collected. Evaluation of assumptions of data are not provided or evaluated.	Justification of method is clear and compelling – it demonstrates the student’s full understanding of both the method and the data characteristics. Assumptions are clearly stated and evaluated.
Data presentation (8 points)	Tables and graphs are not used or fail to enhance the results of the study. Standard conventions for reporting data and results are not included or incorrect.	Tables and graphs are used correctly to provide readers with necessary information and guidance. Standard conventions are adhered to for data representation and reporting.
Interpretation and discussion (8 points)	The discussion is absent, not compelling or fails to address the relationship back to the research question. No or weak implications for policy are provided.	The discussion draws the research to a close, makes the argument for next steps and is clearly connected back to the research question. Well-articulated policy implications that are supported by data are provided.

Appendix C. Proficiency Level Definitions

Proficiency Levels	Definitions
Beginner	Student demonstrates an understanding of common knowledge and terminology, as well as a limited ability to apply basic techniques, concepts, and skills.
Intermediate	Student applies and builds upon common knowledge gained, to include applying techniques, concepts, and skills to common and complex situations found in the health industry. Student articulates the implications of changes to processes, policies, and procedures.
Advanced	Student demonstrates mastery of techniques, concepts, and skills in various complex scenarios. Student consistently provides practical/relevant ideas and perspectives on policy, process or practice improvements.