



## Course Syllabus

### HCM.828 – Data Collection, Analysis, and Representation in Healthcare Spring 2022

#### Faculty Information:

**Name:** Max Saber, DHA, MSHI  
**Phone:** 617-732-2811 (office)  
**MCPHS Email:** [max.saber@mcphs.edu](mailto:max.saber@mcphs.edu)  
**Office:** Virtual  
**Office Hours:** Zoom, by appointment

#### Course Information:

Data Collection, Analysis, and Representation in Healthcare, **Credits: 3**

This is an online course. Students may review each weekly lesson at a time convenient to their individual schedules within the week, but must remain current by completing each lesson and/or assignment within the timeframe indicated in this document.

#### Course Description:

Drawing upon previous course work and contemporary healthcare topics, this course will examine various aspects of data collection and analysis to address complex healthcare challenges with informed decision-making. Proper data collection techniques, critical evaluation of data sources, and data sufficiency are discussed. Best practices for developing visualizations, the process of cognition and translation of visual displays, as well as ethical standards are explored through assignments.

#### Text/ Primary Course Materials:

##### Required Text:

1. Madsen, Laura. (2014). *Data-Driven Healthcare: how analytics and BI are transforming an industry*. (1<sup>st</sup> ed.). New Jersey: Wiley.
2. Supplemental articles and readings as assigned, made available through Blackboard course

##### Recommended Text:

1. American Psychological Association. (2019). *Publication manual of the American Psychological Association* (7<sup>th</sup> ed.). Washington, DC: American Psychological Association.

#### Other Resources:

1. Useful website for APA style guidelines from the [Purdue Online Writing Lab](#)

#### Course Objectives:

By the end of this course, students will be able to:

1. Describe and explain the different characteristics of “meaningful” data,
2. Compare and contrast the various logistical, legal, and ethical challenges related to data extraction and analysis of archival patient data sets,
3. Analyze the process in which research studies are reviewed,
4. Explore the special considerations needed in the design and implementation of research data storage,
5. Compose basic code in the SAS programming language using the SAS Foundation application to perform statistical functions against a data set and evaluate the output,



6. Understand the difference between the SAS Foundation and SAS Enterprise Guide applications and know the advantages/disadvantages of both products,
7. Effectively use descriptive and inferential statistics, along with other advanced modeling techniques, to describe a data set, and
8. Evaluate the different types of visualizations, and their use cases, using SAS Viya and SAS Visual Analytics suite.

**Assessment of Student Learning and Teaching Effectiveness:**

This course will be offered online using Blackboard as the course learning management system. Narrated PowerPoint slides will be posted to Blackboard weekly to present each topic. Students will read the assigned Readings outlined in the course calendar for each topic prior to viewing the PowerPoint presentation for that topic. After reviewing the PowerPoint presentation(s), students will participate in associated discussion board activities to promote learning via reflection. A final research paper as well as various other assignments will be used to assess the course objectives.

**Course Requirements:**

1. **Course Assignments & Data Projects:** 35%  
Students will have course assignments/data projects assigned regularly through the course which will coincide with the topic discussed during that week.
2. **Journal Club/Article Presentation** 20% (total)
  - Student-led Discussion Grade* 10%
  - Journal Club Overall Participation* 10%
3. **Discussion Board Participation:** 10%  
Students will be required through the course to be actively engaged in the posted discussion boards. Discussion board questions will **not** be posted weekly and will be posted around the journal club schedule for the course.
  - Active learning is essential. Students will participate via *Blackboard* in all posted discussion topics. Participation is mandatory with a minimal requirement of 2 postings per week to the discussion board. Students are required to post twice each week, once by Thursday of the week stating their views and once, by Sunday of the week, with a thoughtful reflection commentary after reading the views of classmates.
  - Weekly lessons and assigned readings will be the source of the discussion topics. Questions will be posed at the beginning of each week to initiate discussion
  - Each discussion, unless otherwise stated, will be open for one (1) week with no contributions to the topic accepted thereafter. (This means postings must be completed by 12 midnight EST Sunday of each week; if both postings are not done, a grade of zero is assigned).
  - The faculty member will not comment on each posting, but may comment to provide direction to the discussion as postings accumulate.
  - "Chatter" in the discussion sessions should be avoided; responses to colleagues should advance the conversation and not simply provide praise.



4. **Final Project:** 35%

Guidelines will be distributed starting in week 13 of the course explaining the considerations and requirements of the course’s final project.

**Assignments and Grading:**

All assignments are to be turned in on the due date indicated by 11:59 p.m. EST via the Blackboard learning management system (see the assignment for the specific method). Unless prior approval has been granted from your instructor, two percent (2%) will be deducted for each calendar day late past due date. Faculty reserves the right to not accept any assignments submitted more than three (3) calendar days after the due date.

**Grading**

Grades for the course assignments/requirements listed above will be posted via the Blackboard Grade Center. Students are strongly encouraged to maintain copies all assignments, projects, proposals, and discussion posts submitted for your own records and so your work can be resubmitted if there is a posting or transmission error.

**Grading Scale**

Please note that the graduate grade scheme does not include the grades that are Bolded. Students receiving below a passing grade in graduate level courses will be graded with an F, regardless of the letter grade. Check the grading policies for your program in the University Catalog.

Doctorate students must pass the course with a minimal grade of 83%/B

Masters students must pass the course with a minimal grade of 80%/B-

A	100-93	<b>C+</b>	<b>79-78</b>
A-	92-90	<b>C</b>	<b>77-73</b>
B+	89-88	<b>C-</b>	<b>72-70</b>
B	87-83	<b>D</b>	<b>69-60</b>
B-	82-80	F	<60

**Citations**

All assignments, papers, discussion boards and otherwise will follow American Psychological Association (APA) style guidelines. **There are no exceptions.**

**Plagiarism and Similarity Checking**

Students are expected to abide by the University Academic Honesty Policy as explained in the Student Handbook and University Catalog. Plagiarism is considered a violation of this policy. Plagiarism is defined as submitting another person’s work as one’s own without proper acknowledgment or using the words or ideas of others without crediting the source of those words or ideas. To deter plagiarism and ensure appropriate use of resources in student research and learning, the University subscribes to verification services like Turnitin. Students must submit their written work via Blackboard where similarity checking is carried out and authenticity verified. All incidents of plagiarism either intentional or unintentional will be reported to the Dean of Students as outlined in the Student Handbook.



Please note the following consequences for occurrences of plagiarism:

- 1<sup>st</sup> offense - resubmission of revised assignment with grade deduction of 10% of grade for second submission.
- 2<sup>nd</sup> offense - resubmission of revised assignment with grade deduction of 20% of grade for second submission.
- 3<sup>rd</sup> offense - failing grade for assignment with a grade of 0%.

Any student who does not resubmit their work within 7 calendar days as outlined above will receive a 0% for the assignment. Plagiarism offenses are accumulative throughout a student's academic tenure.

### ***Reuse of Your Own Work: Self-Plagiarism***

Plagiarism includes submitting the same work for assignments in more than one class (copying from oneself) without permission from the instructor and/or appropriate citation, the same or subsequent semesters. If you are retaking a course in a subsequent semester, you must seek approval from your current course instructor about the reuse of materials submitted previously for class assignments and discussions. Your instructor reserves the right to deny this request. If you previously submitted an assignment via Turnitin and you submit the same work for another course or a retake, it will show up on the similarity report as possible plagiarism.

### ***Access to Coursework after the Semester***

You will not be able to access course materials or assignments after Blackboard access for the semester has ended. If you think you might need to reference your work at a later date, be sure you have saved a separate copy of your assignments, papers, and discussions. Faculty cannot provide access to courses after the semester has ended.

### **Course Policies:**

Any issues arising from the syllabus or course requirements should be addressed to the course faculty immediately. If changes to the syllabus are required the faculty member will notify students of the changes.

### **Documented Absence Process:**

To be permitted to make up missed coursework MCPHS students must seek a documented absence from the [Dean of Students office](#). In all cases, it is the student's responsibility to notify the Dean of Students. In the case of an absence (anticipated or urgent), every effort must be made to notify course faculty AND the Dean of Students office. Email notification is preferred.

Regardless of the reason for absence, a student must notify the Dean of Students office and their course faculty or preceptor of the absence. **Students must also complete the online form and upload supporting documentation within five (5) business days from the first date of absence to the Dean of Students office.** A documented absence does not always excuse a student from missing academic work. Students are expected to abide by the course syllabus and academic program's policy related to class absences. Reasons of work conflict, travel, and poor time management are not eligible for documented absence, and acceptance of late work is solely at the instructor's discretion. Permitted absences do not exclude the enforcement of the late submission policy with potential point deductions.



**Email Statement:**

All MCPHS students are required to open, utilize, and maintain the MCPHS email account they are assigned within limits set by Information Services. Official college communications and notices, including communications for this course are ONLY delivered to MCPHS email accounts. All students are responsible for regularly checking their MCPHS email and for information contained therein.

**Guidelines for Faculty Email Communications and Questions:**

You are strongly encouraged to use the Q&A section of the course to post course/assignment-specific questions as peers may either have the answer or benefit from the responses. When you need to contact the faculty by email, they will respond to email messages in a timely manner, generally within 24 hours. Note that weekends and other University holidays affect the timing of email responses from faculty. Students are expected to treat faculty, peers and group members with the same respect that they expect and deserve.

**Office of Student Access and Accommodations (OSAA):**

A student's right to equal education is protected under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act. All students must abide by the Academic Policies and Procedures set forth in the MCPHS Academic Catalog. Questions regarding accommodations can be directed to the Office of Student Access and Accommodations.

Under the ADA/Section 504, students with documented disabilities/conditions, that impact their access to education, and wish to request reasonable accommodations can contact the Office of Student Access and Accommodations (OSAA). To initiate services, students can complete the Student Request for Services Form: [https://mcphs-accommodate.symlicity.com/public\\_accommodation/](https://mcphs-accommodate.symlicity.com/public_accommodation/)

*OSAA can be contacted via email at [OSAA@mcphs.edu](mailto:OSAA@mcphs.edu) or via phone at 617-879-5995.*

**Course Outline:**

*Begins on next page*



<b>Unit 1</b>	<b>Unit 1 Dates:</b> 01/10 – 01/16	<b>Unit 1 Title:</b> Course Introduction, Planning, and Goal Setting  <b>Unit 1 Learning Objectives:</b> <ul style="list-style-type: none"><li>• Introduce HCM.828,</li><li>• Build course goals and establish expectations,</li><li>• Survey students areas of interest as it pertains to data analysis in the healthcare setting, and</li><li>• Ensure course software is installed and usable.</li></ul> <b>Unit 1 Assignments:</b> <ol style="list-style-type: none"><li>1. Introductory Discussion Board</li></ol>	<b>Unit 1 Reading/Viewing:</b> <ol style="list-style-type: none"><li>1. none</li></ol>
<b>Unit 2</b>	<b>Unit 2 Dates:</b> 01/17 – 01/23	<b>Unit 2 Title:</b> Introduction to Healthcare Data and Analysis  <b>Unit 2 Learning Objectives:</b> <ul style="list-style-type: none"><li>• Complete the HCUP-US Data Use Agreement training from AHRQ,</li><li>• Describe the basic uses of healthcare data,</li><li>• Understand the roles of national private sector and government initiatives on healthcare information technology,</li><li>• Identify the major types of administrative and clinical information systems used in healthcare, and</li><li>• Explain the history and evolution of healthcare information systems.</li></ul> <b>Unit 2 Assignments</b> <ol style="list-style-type: none"><li>1. Discussion Board #1,</li><li>2. AHRQ HCUP Data Use Agreement Training</li></ol>	<b>Unit 2 Reading/Viewing:</b> <ol style="list-style-type: none"><li>1. AHRQ HCUP Data Use Agreement Training</li></ol>



<b>Unit 3</b>	<b>Unit 3 Dates:</b> 01/24 – 01/30	<b>Unit 3 Title:</b> Quantitative Statistics and Data Analysis Methods, part I  <b>Unit 3 Learning Objectives:</b> <ul style="list-style-type: none"><li>• Explain and justify the uses for the different identifiable, limited identifiable, and public use data sources available for research purposes,</li><li>• Demonstrate the use of exploratory data analysis and data visualization techniques for presenting aggregate data,</li><li>• Analyze and interpret categorical and continuous variables, and</li><li>• Perform simple statistical analyses on a data set and build a population characteristics table.</li></ul> <b>Unit 3 Assignments:</b> <ol style="list-style-type: none"><li>1. Information in Blackboard</li></ol>	<b>Unit 3 Reading/Viewing:</b> <ol style="list-style-type: none"><li>1. Descriptive Statistics in SAS (lecture)</li></ol>
<b>Unit 4</b>	<b>Unit 4 Dates:</b> 01/31 – 02/06	<b>Unit 4 Title:</b> Quantitative Statistics and Data Analysis Methods, part II  <b>Unit 4 Learning Objectives:</b> <ul style="list-style-type: none"><li>• Explain the use of “Relative Value Units” and their importance in healthcare and healthcare administration,</li><li>• Demonstrate the use of chi-squared test and Z-test to assess the relationship of healthcare practice characteristics, and</li><li>• Build and interpret utilization pattern analyses using a sample data set.</li></ul> <b>Unit 4 Assignments:</b> <ol style="list-style-type: none"><li>1. Information in Blackboard</li></ol>	<b>Unit 4 Reading/Viewing:</b> <ol style="list-style-type: none"><li>1. Inferential Statistics in SAS (lecture)</li><li>2. Students should review and prepare for journal club #1</li></ol>



<b>Unit 5</b>	<b>Unit 5 Dates:</b> 02/07 – 02/13	<b>Unit 5 Title:</b> Quantitative Statistics and Data Analysis Methods, part III  <b>Unit 5 Learning Objectives:</b> <ul style="list-style-type: none"><li>• Describe the value of open source data for examining relationships in health outcomes,</li><li>• Manipulate non-normally distributed data in order to perform multivariable modeling, and</li><li>• Interpret non-parametric statistical tests to show relationships and statistical significance.</li></ul> <b>Unit 5 Assignments:</b> <ul style="list-style-type: none"><li>• Information in Blackboard</li></ul>	<b>Unit 5 Reading/Viewing:</b> 1. Nonparametric Methods in SAS (lecture)
<b>Unit 6</b>	<b>Unit 6 Dates:</b> 02/14 – 02/20	<b>Unit 6 Title:</b> Quantitative Statistics and Data Analysis Methods, part IV  <b>Unit 6 Learning Objectives:</b> <ul style="list-style-type: none"><li>• Build regression models to examine differences in continuous variables,</li><li>• Interpret statistical tests, such as linear regression, to show relationships and statistical significance,</li><li>• Interpret adjusted R-squared value and the odds ratio for evaluating the strength of a logistic regression model, and</li><li>• Analyze SAS output of these models into actionable recommendations.</li></ul> <b>Unit 6 Assignments:</b> 1. Information in Blackboard	<b>Unit 6 Reading/Viewing:</b> 1. Regression in SAS, Part I (lecture)





<p><b>Unit 7</b></p>	<p><b>Unit 7 Dates:</b> 02/21 – 02/27</p>	<p><b>Unit 7 Title:</b> Quantitative Statistical and Data Analysis Methods, part V</p> <p><b>Unit 7 Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Demonstrate the use of logistic regression to identify certain predictors of health outcomes,</li> <li>• Conduct a simple linear regression and one-way ANOVA to determine association between variables,</li> <li>• Evaluate the impact of geographic region on hospital readmissions for selected conditions using a one-way ANOVA, and</li> <li>• Develop the logistic regression equation using the values of the coefficients provided from performing a logistic regression.</li> </ul> <p><b>Unit 7 Assignments:</b></p> <ol style="list-style-type: none"> <li>1. Information in Blackboard</li> </ol>	<p><b>Unit 7 reading/Viewing</b></p> <ol style="list-style-type: none"> <li>1. Regression in SAS, Part II (lecture)</li> </ol>
<p><b>Unit 8</b></p>	<p><b>Unit 8 Dates:</b> 02/28 – 03/06</p>	<p><b>Unit 8 Title:</b> Quantitative Statistical and Data Analysis Methods, part IV</p> <p><b>Unit 8 Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Analyze and interpret categorical and continuous variables stratified by a population characteristic,</li> <li>• Perform series of statistical analyses on a data set to build a comparative table,</li> <li>• Interpret the result of the analysis and the population table into descriptive text, and</li> <li>• Present overall findings and analysis in a properly formatted Table One.</li> </ul> <p><b>Unit 8 Assignments:</b></p> <ol style="list-style-type: none"> <li>1. Information in Blackboard</li> </ol>	<p><b>Unit 8 Reading/Viewing:</b></p> <ol style="list-style-type: none"> <li>1. Summarizing and Presenting Statistical Findings from SAS (lecture)</li> <li>2. Students should review and prepare for journal club #2</li> </ol>
<p><b>Week 9</b></p>	<p style="text-align: center;"><b>Spring Break: 03/07 – 03/13</b></p>		



<p><b>Unit 9</b></p>	<p><b>Unit 9 Dates:</b> 03/14 – 03/20</p>	<p><b>Unit 9 Title:</b> Data Visualization in Healthcare, part I</p> <p><b>Unit 9 Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Build the specified SAS Visual Analytics visualizations listed in Blackboard, and</li> <li>• Understand the strengths and weaknesses of the different Tableau visualizations discussed in this week’s lecture.</li> </ul> <p><b>Unit 9 Assignments:</b></p> <ol style="list-style-type: none"> <li>1. Information in Blackboard</li> </ol>	<p><b>Unit 9 Reading/Viewing:</b></p> <ol style="list-style-type: none"> <li>1. Basic SAS Visual Analytics Visualizations (lecture)</li> </ol>
<p><b>Unit 10</b></p>	<p><b>Unit 10 Dates:</b> 03/21 – 03/27</p>	<p><b>Unit 10 Title:</b> Data Visualization in Healthcare, part II</p> <p><b>Unit 10 Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Build the specified SAS Visual Analytics visualizations listed in Blackboard, and</li> <li>• Understand the strengths and weaknesses of the different Tableau visualizations discussed in this week’s lecture.</li> </ul> <p><b>Unit 10 Assignments:</b></p> <ol style="list-style-type: none"> <li>1. Information in Blackboard</li> </ol>	<p><b>Unit 10 Reading/Viewing:</b></p> <ol style="list-style-type: none"> <li>1. Intermediate SAS Visual Analytics Visualizations (lecture)</li> </ol>
<p><b>Unit 11</b></p>	<p><b>Unit 11 Dates:</b> 03/28 – 04/03</p>	<p><b>Unit 11 Title:</b> Data Visualization in Healthcare, part III</p> <p><b>Unit 11 Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Build the specified SAS Visual Analytics visualizations listed in Blackboard, and</li> <li>• Understand the strengths and weaknesses of the different Tableau visualizations discussed in this week’s lecture.</li> </ul> <p><b>Unit 11 Assignments:</b></p> <ol style="list-style-type: none"> <li>1. Information in Blackboard</li> </ol>	<p><b>Unit 11 Reading/Viewing:</b></p> <ol style="list-style-type: none"> <li>1. Advanced SAS Visual Analytics Visualizations (lecture)</li> </ol>



<p><b>Unit 12</b></p>	<p><b>Unit 12 Dates:</b> 04/04 – 04/10</p>	<p><b>Unit 12 Title:</b> Building Data Dashboards in SAS Visual Analytics</p> <p><b>Unit 12 Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Select different SAS Visual Analytics visualizations to build dashboards,</li> <li>• Use interactive elements to dashboards, such as filters and intra-dashboard actions, and</li> <li>• Use advanced interactive elements to dashboards, such as inter-dashboard actions, buttons, and dynamic titles.</li> </ul> <p><b>Unit 12 Assignments:</b></p> <ol style="list-style-type: none"> <li>1. Information in Blackboard</li> </ol>	<p><b>Unit 12 Reading/Viewing:</b></p> <ol style="list-style-type: none"> <li>1. Building Data Dashboards in SAS Visual Analytics (lecture)</li> <li>2. Students should review and prepare for journal club #3</li> </ol>
<p><b>Unit 13</b></p>	<p><b>Unit 13 Dates:</b> 04/11 – 04/17</p>	<p><b>Unit 13 Title:</b> Ethical Data Collection and Retention in Healthcare</p> <p><b>Unit 13 Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Understand how research studies are designed and written,</li> <li>• Examine the process in which research studies are reviewed,</li> <li>• Explain the de-identification requirement and methods and how they relate to research,</li> <li>• Understand why ethical approval is needed for research, and</li> <li>• Determine and identify issues that need to be considered when designing ethical research.</li> </ul> <p><b>Unit 13 Assignments:</b></p> <ol style="list-style-type: none"> <li>1. Information in Blackboard</li> </ol>	<p><b>Unit 13 Reading/Viewing:</b></p> <ol style="list-style-type: none"> <li>1. Peat, Health Science Research: a handbook of quantitative methods, Chapter 8, Appraising Research Protocols (pp 268 – 286).</li> <li>2. Curtis, E., &amp; Drennan, J. (2013). Quantitative health research: Issues and methods. Chapter 5, Ethical principals in health care research (pp 77 – 90).</li> </ol>



<p><b>Unit 14</b></p>	<p><b>Unit 14 Dates:</b> 04/18 – 04/24</p>	<p><b>Unit 14 Title:</b> Implicit Bias, Informed Consent, and Vulnerable Patient Populations</p> <p><b>Unit 14 Learning Objectives:</b></p> <ul style="list-style-type: none"> <li>• Discuss patients’ privacy rights in relation to research focusing on vulnerable patient populations,</li> <li>• Discuss the privacy regulations that impact human subjects’ research and how they relate to one another,</li> <li>• Explain the impact of the HIPAA privacy and security regulation on the analysis of health information for research, and</li> <li>• Understand the components of informed patient consent in healthcare research.</li> </ul> <p><b>Unit 14 Assignments:</b></p> <ol style="list-style-type: none"> <li>1. Information in Blackboard</li> </ol>	<p><b>Unit 14 Reading/Viewing:</b></p> <ol style="list-style-type: none"> <li>1. Care and Handling of Vulnerable Patient Populations (lecture)</li> <li>2. Curtis, E., &amp; Drennan, J. (2013). Quantitative health research: Issues and methods. Open University Press.</li> </ol>
<p><b>Unit 15</b></p>		<p><b>Final Exam Week: 04/25 – 04/29</b></p>	

**Course Assignments/Rubrics**

Course assignments and their associated grading rubrics will be made available via the course’s Blackboard site during the appropriate week.

**Students must abide by the Academic Policies and Procedures set forth in the MCPHS University Catalog and Student Handbook. Important information regarding Description of Credit Hour Policy, Excused Absence Approval, Disability Support Services for students, Academic Honesty and Plagiarism and other academic policies is set forth in the Academic Policies and Procedures section of the MCPHS Catalog.**

MCPHS University Course Catalog

<https://www.mcphs.edu/academics/university-course-catalog>

MCPHS University Student Handbook

<https://my.mcphs.edu/departments/student-affairs>

**Students must read, understand, and comply with all of these policies and procedures.**