



Course Syllabus

HCM.820 – Informatics and Data Analysis

Spring 2021

Faculty Information:

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Office: Remote
Office Hours: Online or via Zoom, by scheduled appointment

Course Information:

HCM.820 – Informatics and Data Analysis 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:

Supervised study in health science involving a survey of existing knowledge, self-instructed or faculty assisted inquiry into previously published data or methodologies or other faculty approved study of a non-research nature.

Text/ Primary Course Materials:

Required Text:

1. White, S. E. (2016). *A practical approach to analyzing healthcare data*. American Health Information Management Association.
 - a. eText Available: <https://endeavor.flo.org/vwebv/holdingsInfo?bibId=2499561>
2. Supplemental articles and readings as assigned, will be posted to Blackboard

Recommended Text:

1. American Psychological Association. (2019). *Publication manual of the American Psychological Association* (7th ed.). 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 directed study, students will be able to:

1. Discuss the issues related to the extraction and analysis of large archival data sets for patients,
2. Perform various statistical analyses on samples of archival data and write interpretative documents that describes the findings of the analysis,
3. Construct items, such as but not limited to, tables, graphs and charts, diagrams, reports, and dashboards using Microsoft Excel, SPSS, STATA, and Tableau,
4. Identify, assess, and select among statistical methods and models for solving real-world problems weighing their advantages and disadvantages, and
5. Transform large, complex informatics datasets into actionable knowledge through the use of data visualization techniques.



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** **40%**
Comprising the bulk of this course's work, each assignment reflects topics and information from the week's assigned text chapters, supplemental readings or videos, and recorded lectures.
2. **Big Data Project** **25%**
Students will use skills learned over the duration of the semester to complete a formal statistical briefing comprised of a full statistical analysis of a Medicare Patient dataset, and the building of original visualizations to compliment the results/findings of the statistical analysis. This assignment will be opened in Week 13 and due in week 14.
3. **Final Assignment:** **25%**
Students will utilize the statistical and data visualization skills learned through the semester to complete a case study on a topic relevant to healthcare today.
4. **Participation** **10%**
 - 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 [discussion topic 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.

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

Citations:

All assignments, papers, discussion boards and otherwise will follow American Psychological Association (APA) 7th edition 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:

- 1st offense - resubmission of revised assignment with grade deduction of 10% of grade for second submission.
- 2nd offense - resubmission of revised assignment with grade deduction of 20% of grade for second submission.
- 3rd 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.symplicity.com/public_accommodation/

OSAA can be contacted via email at OSAA@mcphs.edu or via phone at 617-879-5995.

Course Outline:

Module One: Data and Statistics in Healthcare		
Unit 1: 1/19 – 1/24	Title: Course Introduction Objectives: <ul style="list-style-type: none"> • Install VMware horizon client to access SPSS and STATA, • Complete the HCUP-US Data Use Agreement from AHRQ, • Analyze a small data set utilizing SPSS, and • Describe different types of data and data flows in healthcare. 	Reading/Viewing: 1. White, Chs. 1, 2
Unit 2: 1/25 – 1/31	Title: Healthcare Data and Statistics, part I Objectives: <ul style="list-style-type: none"> • Explain and justify the uses for the different identifiable, limited identifiable, and public use data sources available for research purposes, • Analyze and interpret categorical and continuous variables, and • Perform simple statistical analyses on a data set and build a population characteristics table. 	Reading/Viewing: 1. White, Chs. 4, 5
Unit 3: 2/1 – 2/7	Title: Healthcare Data and Statistics, part II Objectives: <ul style="list-style-type: none"> • Explain the use of Diagnosis-Related Groups in healthcare and how they can be use in data analysis, • Build and interpret utilization pattern analyses using a sample data set, • Explain the use of “Relative Value Units” and their importance in healthcare and healthcare administration, and • Examine and interpret different accepted benchmarks and other report card data and quality reporting systems. 	Reading/Viewing: 1. White, Ch. 6



<p>Unit 4: 2/8 – 2/14</p>	<p>Title: Building a “Table One” from a Dataset</p> <p>Objectives:</p> <ul style="list-style-type: none"> Analyze and interpret categorical and continuous variables stratified by a population characteristic, Perform series of statistical analyses on a data set to build a comparative table, Interpret the result of the analysis and the population table into descriptive text. 	<p>Reading/Viewing:</p> <p>2. White, Ch. 7</p>
<p>Unit 5: 2/15 – 2/21</p>	<p>Title: Healthcare Data and Statistics, part III</p> <p>Objectives:</p> <ul style="list-style-type: none"> Manipulate non-normally distributed data in order to perform multivariable modeling, Build regression models to examine differences in continuous variables, and Analyze SPSS output of these models into actionable recommendations. 	<p>Reading/Viewing:</p> <p>1. White, Ch. 8</p>
<p>Unit 6: 2/22 – 2/28</p>	<p>Title: Healthcare Data and Statistics, part IV</p> <p>Objectives:</p> <ul style="list-style-type: none"> Explain the calculation of reimbursements using relative value units, Calculate survival curves using that Kaplan Meyer statistical method, and Use statistical methods to predict outcomes between two population groups in the same dataset. 	<p>Reading/Viewing:</p> <p>1. White, Ch. 9</p>
<p>Module Two: Data Visualization in Healthcare</p>		
<p>Unit 7: 3/1 – 3/7</p>	<p>Title: Using Tableau in Healthcare, part I</p> <p>Objectives:</p> <ul style="list-style-type: none"> Connect to an Excel workbook as the primary data source within Tableau, Customize the formatting of different chart and data elements, including Tooltips, Implement a Table Lens into a multi-stacked bar chart, Build the specified Tableau visualizations listed in Blackboard. 	<p>Reading/Viewing:</p> <p>1. Posted to Blackboard</p>



<p>Unit 8: 3/8 – 3/14</p>	<p>Title: Using Tableau in Healthcare, part II</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Understand the different dimensions and variations of Table Calculations, • Understand the process Tableau uses to build Forecast models and display a model in a line graph, • Incorporate map overlays with geographical visualizations to display two dimensions of information, • Build the specified Tableau visualizations listed in Blackboard. 	<p>Reading/Viewing:</p> <ol style="list-style-type: none"> 1. Posted to Blackboard
<p>Unit 9: 3/15 – 3/21</p>	<p>Title: Using Tableau in Healthcare, part III</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Understand how different visualizations are used to report and view performance metrics, • Identify the 80% of root causes from a specified problem using a Pareto chart, • Build the specified Tableau visualizations listed in Blackboard. 	<p>Reading/Viewing:</p> <ol style="list-style-type: none"> 1. Posted to Blackboard
<p>Unit 10: 3/22 – 3/28</p>	<p>Title: Using Tableau in Healthcare, part IV</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Using visualizations to build dashboards, • Adding basic interactive elements to dashboards, such as filters and intra-dashboard actions, • Adding advanced interactive elements to dashboards, such as inter-dashboard actions, buttons, and dynamic titles, and • Creating Tableau Stories from visualizations and adding text and other elements to stories. 	<p>Reading/Viewing:</p> <ol style="list-style-type: none"> 1. Posted to Blackboard
<p>Module Three: Special Applications in Healthcare</p>		
<p>Unit 11: 3/29 – 4/4</p>	<p>Title: Calculating and Visualizing Administrative Data</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Differentiate and discuss the different classifications of administrative data, • Calculate patient census statistics using admission and discharge data, • Discuss the relationship between length of stay and hospital utilization, and • Understand how healthcare organizations use administrative data in day-to-day operations. 	<p>Reading/Viewing:</p> <ol style="list-style-type: none"> 1. Posted to Blackboard



<p>Unit 12: 4/5 – 4/11</p>	<p>Title: Calculating and Visualizing Clinical Facility Data</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Differentiate and discuss the different classifications of clinical facility data, • Calculate different clinical rates, such as morbidity and mortality, surgical complications, and provider consultations, • Explore how clinical facility data is used by the Centers for Medicare and Medicaid, and • Explain how clinical facility data is used in the creation of quality report cards. 	<p>Reading/Viewing:</p> <ol style="list-style-type: none"> 1. Posted to Blackboard
<p>Unit 13: 4/12 – 4/18</p>	<p>Title: Big Data in Healthcare, part I</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Understand the importance of data warehouses, both at a micro and macro level, • Explain the purpose and identify use cases for big data in healthcare, • Discuss how archival data sets are used in health services research, and • Run statistical tests on archival data sets and interpret the results. 	<p>Reading/Viewing:</p> <ol style="list-style-type: none"> 1. Posted to Blackboard
<p>Unit 14: 4/19 – 4/25</p>	<p>Title: Big Data in Healthcare, part II</p> <p>Objectives:</p> <ul style="list-style-type: none"> • Perform advanced statistical tests on large archival data sets, • Explain and justify why each statistical test performed is necessary and the information it provides to a healthcare organization, • Understand the components of a statistical review and how a statistical report is structured, and • Use archival billing data sets to create prediction models using SPSS. <p><i>A semester review of topics will be provided in preparation for the final project in the following week.</i></p>	<p>Reading/Viewing:</p> <ol style="list-style-type: none"> 1. Posted to Blackboard
<p>Unit 15: 4/26 – 4/30</p>	<p>Final Exam Week</p> <p>Students will utilize all of the statistical and data visualization skills learned through the semester to complete a case study that will require the synthesis of said skills to statistically analyze a data set, interpret the results of the analyses, and produce different visualizations of the dataset using Tableau.</p>	

Course Assignments/Rubrics:

All course assignment rubrics and scoring sheets will be provided along with their associated assignment via Blackboard.



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.