

Health Data Analysis

HIM 5129 Section 701

Fall 2020

Credits: 3



College of Public Health

Instructor Information

Instructor: Dr. Bari Dzomba

Preferred pronouns: She/her

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Telephone: 215-204-1892

Office Location: 529 Ritter Annex

Course Day(s): *asynchronous online*

Course Time: weekly modules

Course Location: online via Canvas

Office Hours: Main Campus / Virtual MWF
10:30-11:30 and by appt

Synchronous Session(s):

No required synchronous sessions

Course Prerequisites or Co-Requisites

HIM 5101 - Introduction to Health Informatics, and HIM 5113 Database Administration for Health Informatics Professionals with a minimum grade of B-.

Course Description

Healthcare delivery systems require capabilities to effectively generate, aggregate, and analyze data relevant to the optimal delivery of healthcare and maintenance of health. This course is intended to build on the competencies gained in previous courses surrounding the creation, structure and maintenance of clinical datasets, patient generated health data, and elements of the digital medical record. The course is designed to embrace team-based approaches to solving complex issues in the healthcare delivery system. Students will use data visualization tools paired with quantitative data driven techniques which aid in addressing the challenges in the Triple Aim in healthcare. This course will enable the student to build a basic working knowledge of data analysis, dashboarding, and clinical intelligence platforms using appropriate methodologies.

Course Technology Requirements

All students are required to comply with Temple University's Computer and Network Security Policy.

IMPORTANT COMPUTER REQUIREMENTS

This is a hands on, skills-based course which requires a laptop that is configured for computer programming, data science, and business intelligence. It is the student's responsibility to ensure that complete installations of operating systems, Microsoft Office, R, R studio, Python, Spyder, Tableau Desktop and Tableau Prebuilder, and Power BI are completely installed and configured. This includes any needed database drivers, connectors, and access to the *TU wireless (*for face to face courses). If you need assistance please reach out to the Temple Help Desk for computer support.

Course Format/Instructional Methods

On average, over the semester, this course will require approximately 6 hours of your time per week above the required class/lab time commitment. Please plan to spend approximately 6 hours each week reading materials, completing assignments, and watching assigned videos. Additionally, plan to spend an additional 3 hours/wk for the class time through online learning materials. These expectations are based on the premise that 1) this is a full semester online asynchronous course 2) Temple's policy on credit hours states that 1 semester credit is equivalent to 1 hour (50 minutes) of faculty instruction time per week for 15 weeks (inclusive of exam week) AND a minimum of 2 hours of out-of-class student work.

Course Objectives and Competencies

COURSE LEARNING OBJECTIVES	DEGREE COMPETENCIES ADDRESSED	DIRECT/INDIRECT ASSESSMENT TOOL
1. Understand how data is organized to facilitate analysis in the healthcare setting.	Understanding the importance of data, statistics, and its uses and users in health care. (F2)	All in class and homework Assignments, Mid Term
2. Identify ways in which data quality can be compromised and apply remedies.	Understanding R as a data-analysis platform. R installation, basic and advanced with extensions. Exploring the user interface and learning how to run programs interactively and in batch. (F7, F8)	Literature Review Individual Presentations and discussion, Assignments
3. Communicate analysis results back to management for ongoing quality assurance and process improvement.	Develop strategic initiatives for information management systems and regulatory policies. (F4)	Final Project, Assignments
4. Apply business intelligence techniques to solve specific business problems within the context of the rapidly changing healthcare environment.	Reviewing and developing competency in mathematical concepts. (F5)	Final Project, Mid Term, All in class and homework Assignments
5. Integrate data across multiple sources, transforming it into a single view.	Design user-centric interfaces and portals. (F7)	Mid Term, Final Project
6. Understand and select appropriate data visualization techniques to effectively communicate results.	Integrate data analytics to enhance workflow design and process improvement. Create data visualization techniques.	All in class and homework Assignments, Final Project, Mid Term

	(F10)	
7. Evaluate data from varying sources to create meaningful presentations.	Formulate organizational compliance programs and policies. (F10)	Mid Term, Final Project

Additional Course Information

Please be professional and proactive with me. If you know in advance that you have a conflict it will be easier to resolve the sooner you contact me. All due dates are final except for exceptional circumstances at my discretion.

The College of Public Health supports and encourages diversity and inclusion. All students have the right to be addressed by the name and pronouns that they use for themselves. Please be sure to share your preferred pronoun and if you have a preferred name that you wish to be used in the class.

Course Materials

Throughout the course there will be reading and viewing material listed in Canvas that will open prior to each week's module. You are responsible for ensuring internet access to these materials.

The development of this course included being chosen as a course eligible for the Temple Libraries Textbook Affordability Project in Spring 2020. Course materials have been curated for this course using Open Access Educational materials without students incurring any additional cost.

Current and just in time articles and other media will be presented via Canvas throughout the course.

Required Course Assignments

*Below are brief descriptions of each of the Project Assignments. Please see the course website on Canvas for more detailed information on each assignment and the rubric used to grade it. The course policy on late assignments is that all work must be submitted prior to the due date and time via the Canvas submission. In some cases the rubric allows for some late assignments via a 5-10% penalty. In certain situations, if the student notifies the instructor in advance, a special consideration may be made for late work during the semester. **The final due date of the semester may be before the last day, and there are no exceptions for late work unless the student has completed and been approved for the incomplete process with the College of Public Health. Work submitted outside of the required Canvas submission process will not be accepted (e.g do not send through email).***

Assignment Type	Anticipated Due Date*	Category Weight
Class Activities Assignments	Continuous Submitted to Canvas	25%
Literature Review Individual Presentation – Students will select an article scholarly in nature and with substantial	Individual Presentation week 5 Peer Review due week 6	25%

quantitative aspects to the work. Students will present the findings to the class. Participation in both the selection, presentation, and discussion of the work will be graded.		
Mid Term	Submitted to Canvas as a Word file due Week 7	25%
Final Group Project – Making a difference with data – Each group will develop a research or operational question related to health services, find the best available public or free data, perform analysis in an analytics tool, and present findings to the class.	Submitted to Canvas as a PowerPoint, Word, or PDF file due week 14 Peer Review due at the end of week 15	25%

Grading Scale

93-100 A	87-89 B+	77-79 C+	67-69 D+	0-59 F
90-92 A-	83-86 B	73-76 C	63-66 D	
	80-82 B-	70-72 C-	60-62 D-	

Each assignment will receive a numerical grade and be weighted in the calculation of a final numerical grade as indicated above. Final grades may be rounded up based on continued professionalism and engagement.

Policy on Attendance and Participation

Attendance, lateness, early dismissal, participation, engagement, and professionalism are built into each grading rubric as well as factored into the final grade. Please make every effort to arrive on time, stay until the class is dismissed, and remain engaged and professional. For face to face courses: working on other class assignments, work projects, internship projects, social media, texting, and internet browsing while in class is unacceptable and will be considered as part of the professionalism portion for all grades. *Please do not email me expressing how you are sorry for any inconvenience, as your attendance, participation, and professionalism is for your benefit and not an inconvenience for me.*

E-mail

To facilitate communication, the university requires you to have an e-mail account ending in @temple.edu. During the semester, I will try to return your e-mail within 36 hours unless I am out of the office or the university is closed. E-mails sent after noon on Fridays will generally not be

returned until Monday—please plan accordingly. Please remember that e-mails regarding technology questions should be directed to Temple’s Help Desk at help@temple.edu. <https://secretary.temple.edu/sites/secretary/files/policies/04.74.11.pdf>.

Course Minimum Grade

The College of Public Health requires that all students achieve a minimum grade of “C” for all courses which are considered required for their major. Please check the undergraduate bulletin (<http://bulletin.temple.edu/undergraduate/>) to confirm if this class is a major requirement for your program. For further questions, please see your academic advisor.

The Graduate School requires a grade of B- as a passing grade in all required graduate courses (not electives) and a 3.0 minimum GPA to graduate. For further question, please speak with your graduate program director.

Incomplete

A student will be eligible for a grade of “Incomplete” only if he/she: 1) has completed at least 51% of the work at a passing level, 2) is unable to complete the work for a serious reason beyond his or her control, and 3) files a signed agreement with the instructor outlining the work to be completed and the timeframe in which that work will be completed. The student is responsible for initiating this process and all incomplete forms must be sent to the Associate Dean for Academic Affairs prior to the start of study days in that semester. (Please refer to the following link for more details: <http://policies.temple.edu/PDF/41.pdf>).

Withdrawal from the Course

If a student wishes to withdraw from a course, it is the student’s responsibility to meet the deadline for the last day to withdraw within the current semester (www.temple.edu/registrar/documents/calendars/). Please consult the University policy on withdrawals (<http://policies.temple.edu/PDF/337.pdf>).

Statement on Academic Rights & Responsibilities

Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has a policy on Student and Faculty Academic Rights and Responsibilities (Policy #03.70.02), which can be accessed at <http://policies.temple.edu/PDF/99.pdf>.

Academic Honesty

According to the University Student Code of Conduct, students must not commit, attempt to commit, aid, encourage, facilitate, or solicit the commission of academic dishonesty and impropriety including plagiarism, academic cheating, and selling lecture notes or other information provided by an instructor without the instructor's authorization. Violations may result in failing the assignment and/or failing the course, and/or other sanctions as enumerated in the University Code of Conduct, which can be accessed at <http://studentconduct.temple.edu/policies>.

Disability Disclosure Statement

Any student who has a need for accommodation based on the impact of a documented disability should contact Disability Resources and Services (DRS), Ritter Annex 100, (215) 204-1280 or 215-204-1786 (TTY) or drs@temple.edu, to make arrangements. Students requesting accommodations should meet with the instructor as soon as possible after the start of classes to discuss their needs and to provide documentation from DRS. Accommodations are not retroactive.

Counseling Services

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These concerns or stressful events may lead to diminished academic performance and ability to participate in daily activities. Counseling services are available to assist you. Please refer to the Tuttleman Counseling Center at <https://www.temple.edu/temple-students/health-and-wellness/health-and-counseling>

Sexual Misconduct

Temple University is committed to providing a learning and working environment that emphasizes the dignity and worth of every member of its community, free from discriminatory conduct. Sexual harassment in any form or context is contrary to this commitment and will not be tolerated. Please refer to the University policy on sexual harassment at: <http://policies.temple.edu/PDF/366.pdf> Additional resources related to sexual harassment and ways in which to report an incident can be found at: <http://sexualmisconduct.temple.edu/>

Permission to Record

Due to the potentially sensitive nature of the material discussed in class, recording of lectures and guest speakers is not permitted without express permission of the faculty member. Recording of lectures as a disability accommodation is permitted, but individual students should speak with the course instructor in advance so that it can be done appropriately and respectfully of those participating in class discussion. Students may not reproduce, sell or otherwise distribute any recorded materials for purposes other than educational reasons.

Netiquette Statement

In order to include all students in our diverse community of learners, it is important to foster a respectful and productive online learning environment. Our differences, some of which are outlined in the University's nondiscrimination statement, will add richness to this learning experience. All opinions and experiences must be respected in the tolerant spirit of academic discourse. Treat your classmates and instructor with respect in all communication, class activities, and meetings; please do not attack any individual. Please avoid the use of profanity, sarcasm, and slang as well as the use of all capital letters when composing responses in discussion threads, as these forms of communication may be disruptive. Remember to be careful with your own and others' privacy. Please treat others the way you wish to be treated.

Library Resources

Students may request appointments with Librarians, who can provide targeted assistance at all stages of your project, including exploring a topic, test-driving Temple's academic research tools, and identifying and citing sources. A Subject Librarian has particular skills to focus on your major or the class you are taking. If you don't know your Subject Librarian feel free to reach out to any librarian who will help you make that connection. Schedule appointments individually or in small groups. Easy access to program specific resources may be found in Library research guides <http://guides.temple.edu/hsl>.

College of Public Health students should be aware that there are multiple campus libraries available to them. The Health Sciences site highlights resources typically used by those in the health professions.

Find it by clicking on the Health Sciences Libraries link in top left part of the TULibraries webpage <https://library.temple.edu/> or go directly there <https://library.temple.edu/hsl>.

Ways to make contact:

- Health Sciences Librarians <https://library.temple.edu/hsl/services/reference>
- Use the Ask a Librarian Service at <https://library.temple.edu/hsl/ask>

Continuity of Instruction in Event of Emergency

Students are to register for the TUAAlert System to be made aware of University closures due to weather or other emergency situations and follow all additional university-wide emergency instruction. Students can register for this system on the following site: <http://www.temple.edu/safety/tuready/>. In the event of an emergency, class materials/instructions will be provided in a web-based format via Canvas or web-ex. Students registered for the class will be alerted to any alternate testing procedures and submission of assignment requirements from the instructor via email.

General Policies

All University (<http://bulletin.temple.edu/undergraduate/academic-policies/> or www.temple.edu/grad/policies/index.htm) and College of Public Health policies will be upheld. The *[Graduate or Undergraduate] Student Handbook* for the College of Public Health details College expectations: (<http://cph.temple.edu/student-handbooks>)

Course Schedule

This course is different from a traditional lecture type format with extensive use of in class (online for online courses) simulated exercises. The course materials will serve as the principle guide for you. The aim is to combine a traditional lecture setting with self-paced exercises and pragmatic problems and in class hands on approaches to accompany the theoretical aspects of the course. Course schedule may be subject to change with advanced written notification.

Week 1 (August 24 - 30): Course Introduction

Course Objectives:

- Understand how data is organized to facilitate analysis in the healthcare setting.

Session Learning Objectives:

- Recognize the analytical techniques for decision support
- Describe historical background of decision support
- Describe responsibilities in healthcare decision making
- Review scope and recent trends in healthcare
- Describe health services management
- Describe the data flow in healthcare organizations and how to organize data for analytics

Required Readings/Other Materials:

- Review welcome videos in Canvas
- Introduction to Data Science in Healthcare Reading: <https://www.r2library.com/Resource/detail/1584265329/ch0007s0170>
- Analytics and (Precision Medicine) Decision Support Reading: <https://www.r2library.com/Resource/detail/0128006811/ch0014s0163>
- Hype Cycle for Healthcare Providers, 2019 (Gartner) Reading: *Pages 3-7, then read areas of interest as needed.*
- Develop Good Decision Models to Succeed at Decision Management (Gartner) Reading
- Review Lecture 1

Recommended Readings/Other Materials/exercises:

- Pre-class Prep in Canvas
- Statistics Readings: <https://www.r2library.com/Resource/detail/0340950056/ch0004s0092> Principal components analysis , <https://www.r2library.com/resource/detail/0803625642/ch0006s0141> ANOVA , <https://www.r2library.com/Resource/detail/0781781531/ch0015s0490> Descriptive statistics

Assignments to be completed

- **Post 2 comments and respond to 2 comments on the week 1 discussion board** (advantages and disadvantages of using the “average” function for data analytics, along with healthcare related examples).

- **Homework 1 – Complete Pivot Table exercise** to transform the sample file in Canvas into a Pivot Table, and then find a publicly available file from Healthdata.gov or other health related source and transform that into a Pivot Table. Aggregate Functions must make logical sense (e.g. *don't average a zip code*).
- *Resources include Pivot Table information from e-text and Excel online help --*
<https://www.r2library.com/Resource/detail/111871265X/ch0004s0168>
- <https://support.office.com/en-us/article/Create-a-PivotTable-to-analyze-worksheet-data-A9A84538-BFE9-40A9-A8E9-F99134456576>

Week 2 (August 31 – Sept 6): Course Introduction

Course Objectives:

- Understand how data is organized to facilitate analysis in the healthcare setting.
- Identify ways in which data quality can be compromised and apply remedies.

Session Learning Objectives:

- Review SQL and R syntax and commands
- Summarize analytical techniques used to evaluate healthcare data
- Demonstrate use of exploratory data analysis and visualization

Required Readings/Other Materials:

- Review week 2 videos in Canvas
- Data Analytics Organizational Foundations Lecture Video
- Exploratory Data Analysis and Visualization readings:
https://en.wikipedia.org/wiki/Exploratory_data_analysis ,
<https://www.itl.nist.gov/div898/handbook/eda/section1/eda11.htm>
- How to Get More Value From Data Visualization (Gartner) Reading
- Review Lecture 2
- Download MySQL, R and R Studio (you should have this from HIM5113 if using same computer), and Python/Spyder/Anaconda

Recommended Readings/Other Materials:

- Exploratory Data Analysis Hands on exercise in Python:
<https://towardsdatascience.com/exploratory-data-analysis-8fc1cb20fd15>
- <https://support.rstudio.com/hc/en-us/articles/201141096-Getting-Started-with-R>
- <https://shiny.rstudio.com/gallery/>

Assignments to be completed

- **Post 2 comments and respond to 2 comments on the week 2 discussion board** (When is it appropriate to use EDA along with healthcare related examples).
- **Homework 2 – Perform Exploratory Data Analysis (EDA)** using this tutorial:
<https://www.datacamp.com/community/tutorials/exploratory-data-analysis-python> inside the tutorial website. Create screenshot and short summary of your thoughts by the due date in Canvas.

Week 3 (Sept 7 - 13): Course Introduction

Course Objectives:

- Identify ways in which data quality can be compromised and apply remedies.
- Communicate analysis results back to management for ongoing quality assurance and process improvement.
- Apply business intelligence techniques to solve specific business problems within the context of the rapidly changing healthcare environment.

Session Learning Objectives:

- Identify business intelligence tools for healthcare analytics
- Summarize analytical techniques used to evaluate healthcare data
- Demonstrate use of exploratory data analysis and visualization

Required Readings/Other Materials:

- Review week 3 videos in Canvas
- Review Lecture 3
- Apply These Techniques to Maximize Your Return on Data Quality Technology Investments (Gartner) Reading
- Think Big, Start Small, Be Prepared — Master Data Management (Gartner) Reading
- Review Tableau Learning Videos (Request student license through Tableau education website and download software to your computer):
<https://www.tableau.com/learn/training> Getting started through Visual Analytics

Recommended Readings/Other Materials:

- N/A

Assignments to be completed

- **Homework 3– Choose a healthcare dataset of your choice, connect to the data, setup a basic sheet and one visualization in Tableau, along with a short (pretend) email to management within a healthcare organization explaining results and submit to Canvas Assignments before due date in Canvas.**

Week 4 (Sept 14-20): Predictive Analytics

Course Objectives:

- Understand and select appropriate data visualization techniques to effectively communicate results.
- Communicate analysis results back to management for ongoing quality assurance and process improvement.
- Understand and select appropriate data visualization techniques to effectively communicate results.

Session Learning Objectives:

- Describe the need for predictive analytics in healthcare operations
- Review different approaches to predictive analytics
- Differentiate between data-driven and subject matter judgment
- Develop validation controls for predictive analytics
- Use predictive analytics for strategic decisions or in operational settings

Required Readings/Other Materials:

- Review week 4 videos in Canvas
- Review Lecture 4
- Predictive Analytics readings: https://en.wikipedia.org/wiki/Predictive_analytics , Regulation of predictive analytics in medicine (NIH) Reading
- Read journal article in Canvas - Healthcare predictive analytics: An overview with a focus on Saudi Arabia
- <https://www.r2library.com/Resource/detail/1284088375/ch0010s0182> logistic regression
- <https://www.r2library.com/Resource/detail/1284142019/ch0012s0151> regression analysis

Recommended Readings/Other Materials:

- Vendor material: Read <https://www.healthcatalyst.com/predictive-analytics-healthcare-lessons/> and <https://www.healthcatalyst.com/3-reasons-why-comparative-analytics-predictive-analytics-and-nlp-wont-solve-healthcares-problems/>

Assignments to be completed

- **Homework 4– Practice 2 different predictive analytics techniques** (e.g. regression, forecasting, etc.) in any tool (Excel, Tableau, Microsoft Power BI, R, etc.) and with any dataset and submit to Canvas Assignments by due date.

Week 5 (Sept 21-27): Predictive Analytics**Course Objectives:**

- Understand how data is organized to facilitate analysis in the healthcare setting.
- Apply business intelligence techniques to solve specific business problems within the context of the rapidly changing healthcare environment.

Session Learning Objectives:

- Define data mining processes and techniques
- Construct a decision tree model

Required Readings/Other Materials:

- Review week 5 videos in Canvas
- Decision Tree Readings: <https://www.r2library.com/Resource/detail/1449665489/ch0009s0212> , https://en.wikipedia.org/wiki/Decision_tree , Decision Trees, <https://www.r2library.com/Resource/detail/1284129179/ch0008s0163> Algorithms and Decision Trees

- Data Mining Readings: Magic Quadrant for Data Science and Machine Learning Platforms (Gartner) Reading

Recommended Readings/Other Materials:

- Review Rattle Youtube video <https://youtu.be/ARGfOHPVERc>
- Read article on decision tree models <https://hbr.org/1964/07/decision-trees-for-decision-making>

Assignments to be completed

- **Homework 5 (draft)**– Create a **decision tree model** in Microsoft Office for risk factors for a disease or condition and submit to Canvas by due date.
- **Literature Review Individual presentation** submit to Canvas Assignments before due date.

Week 6 (Sept 28 – Oct 4): Predictive Analytics

Course Objectives:

- Identify ways in which data quality can be compromised and apply remedies.
- Communicate analysis results back to management for ongoing quality assurance and process improvement.

Session Learning Objectives:

- Construct a decision tree model
- Interpret results from a decision tree model

Required Readings/Other Materials:

- Review week 6 video and lecture in Canvas
- Review Individual Presentations in Canvas
- Critical Capabilities for Analytics and Business Intelligence Platforms (Gartner) Reading: Search for the 6 area pertaining to decision trees
- Decision Tree Clinical Article: Decision tree supports the interpretation of CSF biomarkers in Alzheimer’s disease

Recommended Readings/Other Materials:

- View Decision Tree Examples:
<https://public.tableau.com/profile/vinnas.kuttery#!/vizhome/shared/M7XT3ZPSX> ,
<https://public.tableau.com/profile/nguyen.dieu#!/vizhome/Decisiontree/PylogonicDecisionTree>

Assignments to be completed

- **Complete peer review on Individual Presentations** in Canvas before due date.
- **Homework 6– Finish Decision tree (final)** and submit to Canvas Assignments by due date.

Week 7 (Octo 5-11): Decision Support & Quality

Course Objectives:

- Communicate analysis results back to management for ongoing quality assurance and process improvement.

Session Learning Objectives:

- Evaluate a decision-making framework for health service organizations
- Describe techniques that apply to decision-making under uncertainty
- Describe techniques that apply to decision-making under risk
- Develop and interpret the expected value of perfect information
- Analyze sensitivity on outcomes and probabilities in analysis
- Describe multi-attribute decision-making
- Describe issues in clinical decision support

Required Readings/Other Materials:

- Review week 7 video in Canvas
- Read Lecture 7 in Canvas
- Watch Microsoft Power BI videos <https://powerbi.microsoft.com/en-us/modern-enterprise/>
- Decision Making Hands on practice in Power BI: <https://radacad.com/decision-tree-power-bi-part-2> Download the titanic training dataset and sample BI file from Canvas

Recommended Readings/Other Materials:

- Read case study for clinical decision support for community acquired pneumonia at <https://www.ahrq.gov/sites/default/files/wysiwyg/professionals/quality-patient-safety/quality-resources/tools/cap-toolkit/cap-finalreport.pdf>

Assignments to be completed

- **Complete Midterm Exam in Canvas**
- **Choose and Finalize Groups for Final Group Project**
- *No homework assignment since it is midterm exam week*

Week 8 (Oct 12-18): Decision Support & Quality

Course Objectives:

- Communicate analysis results back to management for ongoing quality assurance and process improvement.

- Identify ways in which data quality can be compromised and apply remedies.
- Apply business intelligence techniques to solve specific business problems within the context of the rapidly changing healthcare environment.
- Understand and select appropriate data visualization techniques to effectively communicate results.

Session Learning Objectives:

- Define Quality Control and Continuous Quality Improvement in Healthcare
- Review measures of quality in healthcare operations
- Recognize process variability and randomness
- Develop quality monitoring and control charts
- Use a business intelligence tool to monitor quality and/or compliance

Required Readings/Other Materials:

- Review week 8 video in Canvas
- Read Lecture 8 in Canvas
- Quality Control and Improvement Reading: Continuous quality improvement methodology: a case study on multidisciplinary collaboration to improve chlamydia screening
- Tableau Examples: main Viz gallery <https://public.tableau.com/en-us/gallery/?tab=viz-of-the-day&type=viz-of-the-day> and Quality Improvement Examples https://public.tableau.com/views/DialysisDashboard_0/TableofContents?:display_count=y&origin=viz_share_link , https://public.tableau.com/views/SmartSelangorWaterQualityMonitoringGoogleSheet/Dashboard1?:display_count=y&origin=viz_share_link , https://public.tableau.com/views/SantasToyQualityControl_0/SantasToyQualityControl?:display_count=y&origin=viz_share_link , https://public.tableau.com/shared/DW4TGDK4N?:display_count=n&origin=viz_share_link

Recommended Readings/Other Materials:

- Six Sigma websites
- Joint Commission website
- LCME website

Assignments to be completed

- **Submit Group Final Project Scope in Canvas**
- **Homework 8a– Research a current issue, problem, or concern in any type of health organization and develop a Plan Do Check Act (PDCA) cycle in Word or Powerpoint and submit to Canvas by due date**
- **Homework 8b– Develop a visual in Tableau or Power BI to show the analysis phase of your PDCA cycle and submit to Canvas by due date: This involves a data file that you will need to create (since you won't actually be doing a CQI project you should make up a file with realistic yet dummy data). The visual can be anything from a basic run chart (descriptive analytics) to more advanced predictive analytics**

Week 9 (Oct 19-25): Decision Support & Quality

Course Objectives:

- Communicate analysis results back to management for ongoing quality assurance and process improvement.

Session Learning Objectives:

- Perform analysis using logistic regression, t-test, or ANOVA
- Interpret R^2 and odds ratio
- Develop a research question for a quality improvement project
- Develop a central hypothesis to be tested
- Determine best data set(s) to use
- Design a quality improvement project

Required Readings/Other Materials:

- Review week 9 video in Canvas
- Read Lecture 9 in Canvas
- Statistics Readings: Big Data Analytics for Medical Applications, http://onlinestatbook.com/Online_Statistics_Education.pdf and an example of the new wording around what can be defined as statistically significant <https://rss.onlinelibrary.wiley.com/doi/10.1111/j.1740-9713.2019.01295.x> (*this is a must read based on recent changes around p values in 2019*)

Recommended Readings/Other Materials:

- Tools for performing logistic regression
- Introduction to Statistics Open Courseware Jeremy Orloff, and Jonathan Bloom. 18.05 Introduction to Probability and Statistics. Spring 2014. Massachusetts Institute of Technology: MIT OpenCourseWare, <https://ocw.mit.edu>. License: Creative Commons BY-NC-SA located at <https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-spring-2014/#>

Assignments to be completed

- **Complete 2 posts and respond to 2 comments on the Discussion Board** – Research questions and hypotheses for a quality improvement project
- **Homework 9– Find or create best dataset(s) to perform analysis including logistic regression, t-test, or ANOVA, analyze results, and submit to Canvas by the due date.** Some good examples to follow:
 - Logistic Regression start with step 5 and manually load MLBench package: <https://www.machinelearningplus.com/machine-learning/logistic-regression-tutorial-examples-r/>
 - t-test: <https://www.machinelearningplus.com/statistics/statistical-significance-tests-r/>

- ANOVA: <http://www.sthda.com/english/wiki/one-way-anova-test-in-r> (be sure to also link to the section on how to prepare your data)

Week 10 (Oct 26 – Nov 1): Industry Benchmarking

Course Objectives:

- Understand how data is organized to facilitate analysis in the healthcare setting.
- Understand and select appropriate data visualization techniques to effectively communicate results.

Session Learning Objectives:

- Define productivity in healthcare organizations
- Develop measures of productivity
- Describe commonly used measures of productivity
- Compare productivity across healthcare organizations
- Define performance benchmarking

Required Readings/Other Materials:

- Review week 10 video in Canvas
- Read Lecture 10 in Canvas
- Productivity and Performance Benchmarking Readings: Template matching for benchmarking hospital performance in the veterans affairs healthcare system , Benchmarking healthcare logistics processes a comparative case study of Danish and US hospitals

Recommended Readings/Other Materials:

- https://en.wikipedia.org/wiki/Executive_summary

Assignments to be completed

- **Homework 9– Review a measure on https://nhqrnet.ahrq.gov/inhqrdr/National/benchmark/table/Setting_of_Care/Hospital , develop an executive summary of the results, and submit to Canvas by the due date.**

Week 11 (Nov 2-8): Industry Benchmarking

Course Objectives:

- Communicate analysis results back to management for ongoing quality assurance and process improvement.
- Apply business intelligence techniques to solve specific business problems within the context of the rapidly changing healthcare environment.
- Integrate data across multiple sources, transforming it into a single view.

- Understand and select appropriate data visualization techniques to effectively communicate results.
- Evaluate data from varying sources to create meaningful presentations.

Session Learning Objectives:

- Design a structured query from multiple data sources
- Develop a business intelligence visualization

Required Readings/Other Materials:

- Review week 11 video in Canvas
- Read Lecture 11 in Canvas

Recommended Readings/Other Materials:

- N/A

Assignments to be completed

- Using <https://nhqrnet.abrq.gov/inhqrdr/data/query> run a query to answer a research question. Download the table data, connect to a business intelligence or data science tool such as R, Power BI, or Tableau, and create a meaningful visualization
- Homework 11– insert an image, explanation of your methodology, and summary of results into a Word or Powerpoint and submit to Canvas by the due date.

Week 12 (Nov 9-15): Regression Modeling/Odds Ratio

Course Objectives:

- Apply business intelligence techniques to solve specific business problems within the context of the rapidly changing healthcare environment.

Session Learning Objectives:

- Compare outcomes across a variety of attributes
- Define patient and employee satisfaction
- Define value-based purchasing
- Produce a regression analysis to solve a healthcare related question

Required Readings/Other Materials:

- Review week 12 video in Canvas
- Read Lecture 12 in Canvas
- Comparative Effectiveness Research Readings:
<https://www.r2library.com/Resource/detail/0128499052/ch0019s0461> Comparative effectiveness research,
<https://www.r2library.com/Resource/detail/1284117340/ch0007s0261> CER,
<https://www.r2library.com/Resource/detail/128404792X/ch0019s0550> CER and population health

Recommended Readings/Other Materials:

- Read <https://medicine.temple.edu/sites/medicine/files/files/Multi-Institutional%20Research%20using%20Health%20Records%20PCORnet.pdf>

Assignments to be completed

- Complete 2 posts and respond to 2 comments on the Discussion Board – Describe advantages and disadvantages of Comparative Effectiveness Research
- Homework 12– Using real data from <https://data.medicare.gov>, compare outcomes using Excel, R, Power BI, or Tableau and submit to Canvas by due date.

Week 13 (Nov 16-20): Population Health

Course Objectives:

- Understand how data is organized to facilitate analysis in the healthcare setting.
- Understand and select appropriate data visualization techniques to effectively communicate results.

Session Learning Objectives:

- Using a patient cohort discovery tool (i2b2) for querying the Electronic Medical Record
- Plot variables on a map to show healthcare outcomes geospatially

Required Readings/Other Materials:

- Review week 13 video in Canvas
- Read Lecture 13 in Canvas
- Geographic Impact and Socioeconomic Factors visualizations: <https://community.powerbi.com/t5/Data-Stories-Gallery/The-Power-BI-Whisky-Experience/td-p/328399> , <https://community.powerbi.com/t5/Data-Stories-Gallery/Suicide-Deaths-in-UK/td-p/825984>
- Review <https://www.i2b2.org/webclient/>

Recommended Readings/Other Materials:

- Review PASDA <http://www.pasda.psu.edu> and Data.Gov

Assignments to be completed

- Homework 13 - Using the Tableau, Power BI, R, Data.gov, or PASDA, develop a query related to solving a population health question for geospatial data analysis and submit to Canvas by due date
 - Examples to review https://public.tableau.com/shared/T4N9CG7GK?:display_count=n&:origin=viz_share_link (mental health in FL schools)

- <https://community.powerbi.com/t5/Data-Stories-Gallery/Missing-Migrants-Tracking-Deaths-Along-Migratory-Routes/td-p/342271> (Tracking migrant deaths at the borders)
- **Complete Final Group Project** and submit to Canvas by due date.

Weeks 14 and 15 (Nov 30 – Dec 9): Putting it all together

Course Objectives:

- Integrate data across multiple sources, transforming it into a single view.

Session Learning Objectives:

- Recognize the capabilities needed to effectively generate, aggregate, and analyze data relevant to the optimal delivery of healthcare and maintenance of health.
- Differentiate between different clinical datasets and patient generated health data
- Recognize the team-based approaches required for solving complex issues in the healthcare delivery system.

Required Readings/Other Materials:

- Review Closing Summary Lecture in Canvas
- Review Final Group Projects in Canvas
- Augmented Analytics Is the Future of Analytics (Gartner)

Recommended Readings/Other Materials:

- N/A

Assignments to be completed

- **Present Final Group Projects** and submit presentation to Canvas Assignments before due date.
- **Complete Peer Review on Final Group Projects** and submit to Canvas Assignments before due date.