Fermanian School of Business

BUS/LDR 6025 Applied Data Analysis & Visualization-1

3-Units

Summer (1) 2023

Meeting days: Tuesday	**Instructor name**: Matt Boyne
Meeting times: 5:30-8:15	**Phone**: 760.715-8071
Meeting location: Mission Valley	**E-mail**: mboyne@pointloma.edu
Final Exam: August 22, 2023 Please adhere to University policy for the Final as listed below.	**Office location and hours**: Fermanian 130 10:00-5:00
Additional info: MV Office Hours 3:00-5:15 Tuesdays and all day Fridays at Lomaland	**Additional info**: Call anytime

PLNU Mission

To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Fermanian School of Business Mission

Character – Professionalism – Excellence – Relationships – Commitment - Innovation

As members of a vital Christian community, we strive to provide high quality business programs that equip students to make a positive impact in their workplace and community by connecting purpose to practice.

COURSE DESCRIPTION

This course explores methods of applied data analysis, including capturing, identifying and analyzing data to inform decision making. Topics include an overview of statistical concepts, guidelines for effective data analysis, data visualization principles, and presenting and evaluating alternative solutions. Emphasis will be placed on designing and creating data visualizations to communicate with various stakeholders.

COURSE LEARNING OUTCOMES

Upon completion of this course, students will be able to:

1. Identify the processes and issues associated with research problem definition, research design, question, scale and survey design, sample design, data collection, data analysis, and writing and

presenting research methodology (PLO 1 & 6).
2. Determine an appropriate research methodology to achieve specific research objectives that includes quantitative and qualitative data collection/analysis techniques (PLO 3).
3. Analyze research projects to determine the appropriateness of methods (PLO 2).
4. Interpret the appropriate use of emerging business research methods (PLO 3).
5. Collaborate with a team to present current topics (PLO 6 & 7).

REQUIRED TEXTS AND RECOMMENDED STUDY RESOURCES (Have access to the books and your laptop for every class please)

1. For a main text on Data Communication as an option, the bookstore has a Coursepack for BUS 6025. This is a selection of specific chapters from the textbook. Call (619) 849-2342 if you want that copy of the specific sections.
2. As a second option, the primary textbook is Business Analytics, Communicating with Numbers 1st Edition from McGraw Hill. The authors are Jaggia, Kely, Lertwachara and Chen. Please get either the Coursepack or the full text, your option based on cost and your use of the larger McGraw Hill resources.
3. As the primary source on Tableau we will use Visual Analytics with Tableau by Alexander Loth. This book is available digitally for free from our Library at this link
4. Research and choose a single book from any of the following authors that you wish to learn more about (just one book). This book, again just pick one from any of the authors on this list, will form the foundation for two individual assignments in class:
    a. Thomas Davenport (for business executives)
    b. Stephen Few (for data visualizations)
    c. Cole Nussbaumer Knaflic (data communication)
    d. Edward Tufte (presentation skills)
    e. Nathan Yau (public policy)
    f. David McAndless (design thinking)
5. Get a Tableau download for Students (free). Follow the instructions for the Desktop version. It is important that you get this loaded before week 2 begins.

Supplemental and free: From our Library both these books can be used to understand Managerial Analytics and Visualizing Data with Excel:

https://pointloma.on.worldcat.org/oclc/857068245

https://ebookcentral-proquest-com.pointloma.idm.oclc.org/lib/pointloma-ebooks/detail.action?docID=5993965

ASSESSMENT AND GRADING-Specific Details at the end of the Syllabus

- Exams are Open Book
- All submitted homework and exams are to be an individual effort though group study is encouraged. If an assignment is Team Based Learning or EduScrum the team's work will be submitted in the team assignment and the previous request does not apply.

Prof Note: Professional Standards: We have to live by our values in our class performance:

- Punctuality. Is the student on time for every class showing the Fermanian Value of Commitment?
- Attendance. Are the University's policies of absences and attendance adhered to?

- Professionalism per Fermanian Values. Is the student engaged in the material, using electronic resources properly, fully present in the class, and contributing to the body of knowledge we are developing as a class?
- Excellence per Fermanian Values. Are questions, comments, positions and effort in line with standards of Excellence as stated in the Fermanian Values?

1. Pretest for Quantitative Research Techniques and Statistics 5% 50 Pts 2. Post-test for same 5% 50 Points 3. 5 Team Based Learning Exercises 25% 250 Points 4. Book Review and Discussion 30% 300 Points 5. Midterm 15% 150 Points 6. Final 20% 200 Points 1000 Points and 100%	Sample grade scale: A=93-100 C=73-76 A-=92-90 C-=70-72 B+=87-89 D+=67-69 B=83-86 D=63-66 B-=80-82 D-=60-62 C+=77-79 F=0-59

INCOMPLETES AND LATE ASSIGNMENTS

All assignments are to be submitted/turned in by the beginning of the class session when they are due—including assignments posted in Canvas. Late work may be subject to a 25% penalty. Incompletes will only be assigned under extremely unusual circumstances.

SPIRITUAL CARE

PLNU strives to be a place where you grow as a whole person. To this end, we provide resources for our graduate students to encounter God and grow in their Christian faith. At the Mission Valley (MV) campus we have an onsite chaplain, Rev. Gordon Wong, who is available during class break times across the week. If you have questions for, desire to meet or share a prayer request with Rev. Wong you can contact him directly at mvchaplain@pointloma.edu or gordonwong@pointloma.edu. Rev. Wong's cell number is 808-429-1129 if you need a more immediate response.

In addition, on the MV campus there is a prayer chapel on the third floor which is open for use as a space set apart for quiet reflection and prayer.

PLNU COPYRIGHT POLICY

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU ACADEMIC HONESTY POLICY

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the

seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See the Academic Honesty Policy in the Graduate and Professional Studies Catalog for definitions of kinds of academic dishonesty and for further policy information.

PLNU ACADEMIC ACCOMMODATIONS POLICY

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities. Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2486). Once a student's eligibility for an accommodation has been determined, the EAC will issue an academic accommodation plan ("AP") to all faculty who teach courses in which the student is enrolled each semester.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course and/or if they do not wish to utilize some or all of the elements of their AP in that course.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC.

SEXUAL MISCONDUCT AND DISCRIMINATION

Point Loma Nazarene University faculty are committed to helping create a safe learning environment for all students. If you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking, know that help and support are available through the Title IX Office at pointloma.edu/Title-IX. Please be aware that under Title IX of the Education Amendments of 1972, it is required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at pointloma.edu/title-ix

COURSE MODALITY DEFINITIONS

1. In-Person: Course meetings are face-to-face with no more than 25% online delivery.

2. Online: Coursework is completed 100% online and asynchronously.

3. Online Synchronous: Coursework is completed 100% online with required weekly online class meetings.

4. Hybrid: Courses that meet face-to-face with required online components.

PLNU ATTENDANCE AND PARTICIPATION POLICY

Regular and punctual attendance at all classes is considered essential to optimum academic achievement. If the student is absent from more than 10 percent of class meetings, the faculty member can file a written report which may result in de-enrollment. If the absences exceed 20

percent, the student may be de-enrolled without notice until the university drop date or, after that date, receive the appropriate grade for their work and participation. See Academic Policies in the Graduate and Professional Studies Catalog for additional detail.

The second absence, other than University excused, may result in a 50 point, penalty, the third 100 points and the fourth 250 points. Please do not be late for class as a professional standard. Late arrivals can be considered absences.

FINAL EXAMINATION POLICY

Successful completion of this class requires taking the final examination on its scheduled day. No requests for early examinations or alternative days will be approved.

COURSE SCHEDULE AND ASSIGNMENTS

Module 1 Statistics and Analytics Weeks 1 and 2

Week of May8th: The first module introduces key probability concepts that underpin most statistical and analytical methods. Without a strong foundation in the ideas of probability, randomness, and uncertainty, it is very difficult to truly understand and correctly apply most statistical inference methods. The normal distribution is the lynchpin to most of statistics through the central limit theorem, which underlies much of classical statistical methodology. When making decisions in an inherently uncertain world, the rules and laws of probability help provide support for addressing issues that arise from uncertainty.

As part of Module 1, please do the following:

Quantitative Research Techniques and Statistics Course Assignment Leveling Module

You are required to take the Quantitative Research Techniques and Statistics course assignment leveling module. The time to complete the module is estimated at 6 to 9 hours, depending on your previous exposure to the subject.

To access the Quantitative Research Techniques and Statistics module, follow the on-screen instructions found at the following URL: https://micro.peregrineacademics.com/pointloma
The password for the module is: PLNU-1001

If you have any problems with the registration process, please visit Peregrine's technical support page at: http://www.peregrineacademics.com/support

To successfully complete the module, you must earn a minimum score of 80% on the module post-test. You are allowed to attempt the post-test twice. If you have not achieved a passing score (80%) after two attempts, you will be required to purchase a new module for $39.00 and continue attempts until a passing score is achieved at the same URL:
https://micro.peregrineacademics.com/pointloma
The password for the retake module is: PLNUPAY-1001

If you take any modules that are not assigned to you for this course, you will be billed for each module at $39. Modules should only be taken when assigned by the course and NOT earlier. This module is worth 5% of your total course grade. The deadline for completing the module is January 22nd. The percentage earned on the leveling module post-test will be translated into points earned in this course as follows:

Post-test Percentage	Points Earned in Course
95.00-100	50
90-94.99	45
85.00-89.99	40
80.00-84.99	35
<80.00	0

Week 1 5/8 - There is no face-to-face class or Zoom session. Please work at your own pace but have the assignment completed by 5/22. Follow the directions for the Quantitative Research Techniques and Statistics Module Pre-Test. Get a notebook and pen so you are ready to take notes during the Pre-Test.

As you take the Pre-Test and come across terms that you do not know, need further explanation about, or require additional information stop and write out the term before you answer the question. Try to create a study plan of information you need to get a 100 on the test.

Then complete the Module…BUT don't take the Post-Test yet. See if you can answer your questions, if not do a general web search and answer the questions.

The first week's assignment is worth 50 points, or 5% of your grade. For each question or term you do not know research that term using the Module, Coursepack/Text (without taking the post test) or a general web search, write out what the term or concept means. The submission will be a Word document with your name on it listing the term, the research's results and the source. Even if you got a 100 on the pretest please list anything that required greater explanation.

HW#1 Due 5/15 – Pre-Test Write Up 5% or 50 Points

Week 2 -5/16 – Introduction and Basic Statistics for Analytics

Statistical inference focuses on generalizing information from a sample to a population. Confidence intervals and hypothesis tests allow for using data to inform our understanding about the underlying process or population. The central limit theorem (CLT) forms the foundation of classical statistical methods when drawing inferences about both population means and population proportions. The goal of confidence intervals is estimating a range of reasonable values for the parameter, while hypothesis testing allows us to use data to examine the likelihood of a preconceived parameter value.

Introduce Analytics, our class syllabus and Class Guided readings on Chapter 4 in Course Pack in order to close any questions from the Pre-Test.

HW #2 5/22 – Post-Test Module for Statistics 5% or 50 Points

Week 3 5/23 – Introduction to Analytics and Tableau

Business analytics is "the methodology of extracting information and knowledge from data that improves a company's bottom line and enhances consumer experience." The focus is on how the leader derives information from the data that can help the organization. The focus of the leader has shifted (somewhat) from 'how can I get more, rich data?' to 'how can I use the myriad data I have to improve the business?' To answer this question, a clear understanding of the data is key, as that will drive the methods applied.

In Class Guided Readings – Chapters 1 of Visual Analytics with Tableau (VAT); and Chapter 1 of the Course Pack/Jaggia text; Please begin reading and preparing for your individual class Data Book Discussion; also read Data Visualization with Tableau

Week 4 – 5/30 – Visualizing Categorical and Numeric Values

Learning Objectives:

- Types of Measures
- Introduction to Data Structuring
- Communicating with Data
- Connecting to Data with Tableau
- Introducing Excel as an Analytic Tool
- Readings Chapter 2 VAT; Sections 3.1-3.3 from the Course Pack or the Jaggia et al. text

In class-Team Based Learning #1, post results 5% or 50 points. First 4 slots for book discussion are available.

After class-"Organize Data and Create Filters" https://elearning.tableau.com/tableau-fundamentals

Week 5 – 6/6 – Visualizing Summary Measures

Learning Objectives: Use both Excel and Tableau to visualize summary measures

Discuss previous week's work in the application use "chalk talks" and "EduScrum". Readings of Chapter 3.4-3.6 in the Course Pack; and Chapter 3 Visual Analytics with Tableau. Next 4 slots for book discussion are available.

After class "Build Common Views" https://elearning.tableau.com/tableau-fundamentals

Week 6 6/12 – Practice Data Visualizations with Tableau and Excel

Learning Objective: Use TBL for Tableau questions and problems. Select the right visualization forms given numeric and categorical variables.

Read Chapter 3 of Jaggia et al., or the Coursepack for review and Chapter 4 of VAT. Next 4 slots for the Book Discussion are available.

After class to do-"Map Geographic Data" https://elearning.tableau.com/tableau-fundamentals

TBL # 2 Submission 50 points or 5%

Week 7 6/19 – Data Driven Decision Making

Learning Objective: Create the right visualization with the right data so as to inform the right decision at the right time for the right problem.

Data-driven decision making is the practice where data is collected, analyzed, and decisions are made based on the insights which are derived from the collected information. The process is more objective and can be quickly evaluated according to the influence of the data on metrics. Data-driven decision management is crucial for every organization regardless of sector. It helps the management to plan to see what will speed the operation to save time. Data based decision also helps to use past information to predict what is to happen in the future. Without data, there are a lot of risks, such as performing on false assumptions and being swayed by biases. The approach can be used by big businesses for big data analysis diagnostic modeling, and processing to enhance excellent performance. The success of data-based decision making depends on various factors. For example, the method that is used for data collection and the quality of the data. Data based decision management is heavily quantitative. It requires powerful, and enough, machines which are capable of computing and analyzing the big sets of data in the most efficient way.

Please read Tableau Data Driven Decision-Making and Chapter 5 VAT.

The class will practice several data sets for data-driven decisions in preparation for the Midterm in Week 8

After class to do-"Create Calculated Fields" https://elearning.tableau.com/tableau-fundamentals

Week 8 6/26 - Midterm in class, open book for 200 Points or 20%

After class to do-"Apply Table Calculations" https://elearning.tableau.com/tableau-fundamentals

Week 9 No Class for July 4th Holiday

Week 10 7/11 –

Predictive Analytics relies on regression analysis. Regression is arguably the most common analytic technique used today. The goal has shifted from learning about a single variable to how multiple variables work together. Inferential goals remain (Does variable x impact or relate to variable y?), but goals of prediction (predictive analytics) are now introduced. The response variable is numerical, but the independent variables can be of any type. This module focuses on finding the line (plane) of best fit, evaluating the goodness-of-fit, testing significance, and ensuring the assumptions of the model are maintained. Regression analysis is the first 'model building' technique within the predictive analytics framework.

Read-Regression Analysis Course Pack 5.1-.2; or Jaggia 6.1-.3 and Chapter 6 of Visual Analytics with Tableau.

In class Lecture Predictive Analytics and for Tableau. Next 4 slots available for Book Discussion.

After class please do-"Apply Analytics" https://elearning.tableau.com/tableau-fundamentals

Week 11 7/18 – Regression Analysis Review Course Pack 5.1-.3 (Jaggia 6.1-6.3), and Chapter 7 of Visual Analytics with Tableau. In class EduScrum Predictive Analytics Project. Next 4 Book Discussion slots are available.

After class to do-"Work with Multiple Data Sources" https://elearning.tableau.com/tableau-fundamentals

Week 12 7/25 – Introducing Dashboards. In class, TBL # 3 on Tableau and Maps. Next 4 slots are available for Book Discussion. VAT Chapter 8 and watch https://www.youtube.com/watch?v=mT4OuzpVPDk

Links to an external site.

In class submit TBL # 3

After class to do-"Create Dashboards and Stories" https://elearning.tableau.com/tableau-fundamental

Week 13 8/1 Please read Creating Dashboards in Excel, Chapter 9 from VAT and these links:

Tableau Dashboards:

- http://www.tableau.com/solutions/business-dashboards
- http://www.tableau.com/solutions/sales-reporting-and-analytics
- https://public.tableau.com/s/gallery/fastest-growing-companies-america
- https://public.tableau.com/s/gallery/zillow-market-health-index

In class, EduScrum dashboards for Tableau and Excel. 4 more slots are available for Book Discussion.

After class to do-"Share and Publish Content" https://elearning.tableau.com/tableau-fundamentals

Week 14 8/8 – The final piece of the analytics 'puzzle' is prescriptive analytics. Some people regard prescriptive analytics as a very broad term that encompasses all analytics techniques with an overall goal of improving business decision-making. However, most people prefer making a distinction between descriptive, predictive, and prescriptive analytics, where prescriptive analytics uses simulation and optimization algorithms to quantify the effect of different possible actions by a decision-maker to help make a more informed decision. Prescriptive analytics focuses on decision-making based on analytical models. Once the models have been built, tools like

simulation allow for understanding the distribution of outcomes given the decision made by the company to allow for more goal-oriented decisions. Linear programming (as well as integer programming) is a constrained optimization technique in which the allocation of limited resources can be distributed to optimize output. Prescriptive techniques are truly focused on understanding the implications of decisions and how to optimize decision-making.

Prescriptive Analytics Chapter 6. 1-.2 in Course Pack or Chapters 13.1-2 of Jaggia et al. In class TBL #4 on Tableau.

- https://public.tableau.com/s/gallery/educating-girls (dashboard that used a story point format to include an acknowledgement/general information slide)
- https://public.tableau.com/s/gallery/30-minutes-bay-area-bike-share (dashboard that used a story point format to include a slide that described the data and calculations used to make the visualizations)
- http://public.tableau.com/shared/Z3NB9N3Q2?:display_count=yes&:showVizHome=no

Week 15 8/15– Prescriptive Analytics Chapter 6.3-.5 in Course Pack. In class Team Based Learning # 5 on Tableau.

- https://medium.economist.com/mistakes-weve-drawn-a-few-8cdd8a42d368

  https://public.tableau.com/views/TheEvolutionoftheSpeedRecord/EvolutionoftheSpeedRe

  cord?:embed=y&:showTabs=y&:display_count=yes&:showVizHome=no

- http://www.nytimes.com/interactive/2013/10/09/us/yellen-fed-chart.html?_r=0

  Additional resources about making and presenting story points in Tableau:

- http://onlinehelp.tableau.com/current/pro/online/windows/en-us/stories.html
- https://public.tableau.com/s/blog/2014/07/story-points-sizing-tips
- https://www.youtube.com/watch?v=u8aOJizBGtY

Week 16 8/22 In-Class Final.

Book Review and Discussion Assignment (300 Points or 30%):

Please select a book of interest from the provided list in the attached document. This individual assignment has 2 elements. The first is a 20 minute, "Ted Talk" style discussion. Don't think of this as a presentation in a business sense but rather a professional discussion of the book's theme that you and your colleagues can use in leading a data driven decision making project. You may use any media you wish or the whiteboard, or handouts. This is a discussion, not a presentation. The discussion should be based on the book of choice and focus on 4-6 key themes from the author(s). This isn't a traditional book report. Instead the "Ted Talk" should explore the 4-6 themes and describe the author(s) intentions as to how the themes should be employed to enhance performance in the organization inviting comment from colleagues. Then the next part of the "Ted Talk" will take the themes and translate them into specific methods that you can use in

the context of your calling/profession/job also inviting comment. The themes should take the first half and the application the second. The "Ted Talk" will be graded with the Fermanian MBA Presentation Rubric which is attached. (15% or 150 Points). After the discussion please submit any media that you used to guide the discussion.

The second half of the assignment is a 2-page single spaced document. No APA format is needed other than a name and subject as with a professional memo. The Word document will use 12-pitch font, standard margins and follow the same flow. The first page will state, explain and explore the 4-6 themes from the author. Then the next page will detail the explanation of how the themes fit into the student's professional framework. The written section will be graded with Fermanian MBA Written Rubric (15% or 150 Points). The second part will be due by the end of class though you may submit any time.

Team Based Learning (TBL)-Five TBL Exercises, 50 points each for 250 points or 25%

Team-based learning (TBL) is a pedagogical strategy that engages student knowledge through individual testing and group collaboration. Following individual answers, students join teams and work through problems, appealing when they are incorrect if students believe the prof to be in error, or they'd like to debate the point. This process motivates students by holding them accountable to themselves and one another, while introducing them to a variety of thought processes devoted to a single problem. To increase motivation and introduce a fun gaming environment, instructors often group their students into teams and have them compete on various classroom learning tasks.

The strategy is flexible enough to be implemented in classes of varying sizes including large lecture courses, and students have reported growing in their creative thinking and oral communication through TBL.

Team-based learning typically follows a set procedure (adapted from the Team Based Learning Collaborative):

1. Students complete pre-class readings and/or other assignments such as listening to a pod-cast.
2. At the beginning of class, students complete an Individual Readiness Assurance Test (iRAT) to measure what they learned from their pre-class assignments. This test follows a short multiple choice format using questions that fall on the lower level of Bloom's Taxonomy. The goal of this assessment is to hold students accountable for the material. No answers will be provided yet
3. After completing this assessment, students join with their team and complete a Team Readiness Assurance Test (tRAT). As the tRAT is completed student teams will place the answers on the whiteboard.
4. Students next have the chance to appeal any questions they answered incorrectly.
5. The instructor provides a mini-lecture on areas where the students are still having trouble.

6. Students engage with activities that apply and extend knowledge gained using specific text book exercises that have one right answer. Through their experiences with teamwork and knowledge gained through collaboration, the benefits of collaborative work during TBL can extend beyond the classroom into actual work application.

Midterm open book exam in class – 150 points or 15%

Final open book exam in class – 200 points or 20%