

The Max M. Fisher College of Business
Department of Operations and Business Analytics
BUSMGT 7331: Descriptive Analytics and Visualization
3 Credit hours, Spring Semester 2022, Term One (January 10 2022)

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Lecture Asynchronous: One recorded lecture per week. Lecture video and PDF file will be available in Carmen on Wednesday at 5:00 PM.

Recitation Hours: Thursdays 6:00 PM to 7:30 PM.

Three Saturdays: 8:30 AM -12:00 PM. 1/22, 2/5, 2/19. 265 Gerlach.

1. **Course Description**

Businesses and organizations today collect and store unprecedented quantities of data. In order to make informed decisions with such a massive amount of the accumulated data, organizations seek to adopt and utilize data mining and machine learning techniques. Applying advanced techniques must be preceded by a careful examination of the raw data. This step becomes increasingly important and also easily overlooked as the amount of data increases because human examination is prone to fail without adequate tools to describe a large dataset.

Another growing challenge is to communicate a large dataset and complicated models with human decision makers. Descriptive analytics, and visualizations in particular, helps find patterns in the data and communicate the insights in an effective manner. This course aims to equip students with methods and techniques to summarize and communicate the underlying patterns of different types of data. This course serves as a stepping stone for further predictive and prescriptive analytics.

2. **Course Learning Outcomes**

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

- Identify various distributions that frequently occur in observational data.
- Compute key descriptive statistics from data.
- Measure and interpret relationships among variables.
- Transform unstructured data such as texts into structured format.
- Communicate various descriptive statistics with visualization.
- Design advanced visualizations curating visual elements.
- Explain pros and cons of visual representations depending on context and form of data.
- Choose visualizations for special data types such as geographic, text and network data.
- Compose a visual dashboard composed of interactive visual artifacts.

3. **Prerequisite**

- Enrollment in Fisher's Specialized Master's Degree Program in Business Analytics (SMB-A).
- Courses:
 - BUSMGT 6400: Statistics and Data Analysis for Managers.
 - BUSMGT 7250: Data Management for Analytics.
- Or permission of the instructor.

4. **Course Materials**

- Required Textbooks:
 - **Reference one (R1):** Python Data Analytics with Pandas, NumPy, and Matplotlib, by Fabio Nelli (2018, Second Edition). OSU Libraries.
 - **Reference Two (R2):** Data Analysis and Visualization Using Python: Analyze Data to Create Visualizations for BI Systems, by Ossama Embarak (2018). OSU Libraries.

- I will assign relevant chapters from R1 and / or R2 each week.
- Required DataCamp Chapters provided via Datacamp Academic.
- Additional relevant materials or URLs will be posted along with each lecture.

5. Weekly Schedule

- Week 1 (1/10-1/14): Data Wrangling and Descriptive Statistics.
- Week 2 (1/17-1/21): More Data Wrangling, Covariation, and Customizing Visualization.
- Week 3 (1/24-1/28): More Data Wrangling and Visualization.
- Week 4 (1/31-2/4): Describing Textual Data.
- Week 5 (2/7-2/11): Geospatial Visualization.
- Week 6 (2/14-2/18): Interactivity and Dashboard Design.
- Week 7 (2/21-2/25): Visualizing Models, Dimensionality Reduction, and Clustering.
- Week 8 (2/28-3/1): Final Exam. Opens at 8:00 AM on 2/28, closes on 3/1. Timed. 4 hours.

No homework and no DataCamp assignment on the 7th week.

6. Course Components and Grading Breakdown

Assignment Category Points:

- DataCamp Assignments 15 (Seven assignments will be given. Each will last about 3 to 4 hours. Need to complete at least six. Three assignments will have 3 points each, and the remaining three will have 2 points each).
- Weekly Homework Assignments 30 (Five assignments each weighing six points).
- Three in-class Activities on the three Saturdays 15 (5 pts/week).
- Participation 5 (Attendance, Class Activities, Discussion Board).
- Final Exam 35.
- Total 100.

Late submissions will not be accepted. Please refer to Carmen for due dates.

6.1 DataCamp Assignments (15%)

Students will be assigned to complete a set of DataCamp courses or chapters every week. Each chapter completed in time is 3 or 2 points. If students complete them after the due, students receive half points. DataCamp assignments are due every Friday 11:59 PM EST except for the first week. The Datacamp assignment for the first week is due on the second Friday (1/21) to give buffer for sign-up and settling in. No assignment during the seventh week.

6.2 Weekly Homework Assignments (30%)

Each week, a problem set will be delivered via a Carmen quiz. These problem sets will be untimed, open material, but must be answered by individual work. These questions can include multiple choice, true/false, numeric answers, and potentially small image uploads. The answers to the problem sets must be submitted by 11:59 PM on Fridays (to allow for discussion on the in-class weeks). Late submissions will not be accepted. The only exception is Week 7 which does not have a weekly problem set in order for students to have time to prepare for the final exam.

6.3 In-class Activities (15%)

The weeks in which we meet, we will also have a mini-project to complete worth 12% of the grade. These will involve some more focused intense data analysis individually or in groups. Part of the in-class session will be devoted to questions/clarification but most of the time will be spent in a more holistic activity covering the 2 weeks of online content consumed. When in-person session is not permitted, we will have synchronous zoom session.

6.4 Participation (5%)

This course runs a discussion board on Carmen under “Discussions” tab. Each week has a dedicated thread for Q&A and discussions. Students are expected to ask questions on the discussion board. Students are also encouraged to answer peers’ questions. Students may also post a thought or share an external link relevant to the week’s content. Participation will be graded at the end of the semester. Questions, answers, and any posts will count.

6.5 Final Exam (35%)

The final exam will be opened on the first day of exams (2/28 at 8:00 AM) and closed the following evening (3/1 at 11:59). The precise format of the exam to be determined.

7. Other Course Policies

7.1 Recitation/Office Hours

Each week, I will be available remotely via zoom for synchronous office hours. Office hours will be held every Wednesday from 6:00 PM to 7:30 PM. These sessions will provide students with the ability to ask probing questions on the current material and clarify gaps in understanding. Please feel free to bring problems from the book or outside questions for practice as well. If you have a specific question that you’d like to delve into, please bring it up on the discussion board so I can adequately prepare a solution in advance if possible.

7.2 Course Instruction tool

Python will be the coding tool for all course materials. Jupyter Notebook will also be the interface. Demonstration and instruction on how to download the tool will be provided at the beginning of the course. Python is a free software widely used for data manipulation, statistical computing, machine learning, graphics, web applications and many more. It is supported by Python Software Foundation as well as large number of users. Python is versatile, easy to learn, has extensive libraries and is known to have large user base. It is one of the most extensively used software in the analytic community worldwide. Each lecture session will be accompanied by a demonstration of Python that focuses on specific tasks related to the discussion topic.

7.3 Course Technology and Help

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- Self-Service and Chat support: <http://ocio.osu.edu/selfservice>.
- Phone: 614-688-HELP (4357).
- Email: 8help@osu.edu.
- TDD: 614-688-8743.

7.4 Microsoft Office 365

All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft’s Student Advantage program. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.

7.5 Faculty Feedback and Response Time

I am providing the following list to give you an idea of my intended availability throughout the course. Remember that you can call 614-688-HELP at any time if you have a technical problem.

- Grading and feedback: For large weekly assignments, you can generally expect feedback within 7 days.
- E-mail: I will reply to e-mails within 24 hours on school days.

- Discussion board: I will check and reply to messages in the discussion boards every 24 hours on school days.

7.6 Academic Integrity Policy

7.6.1 Policies for this Online Course

- Quizzes and exam: You must complete the answers to quizzes, problem sets, and exam yourself, without any external help or communication.
- Reusing past work: In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- Falsifying research or results: All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- Collaboration and informal peer-review: The course includes many opportunities for formal collaboration with your classmates. While study groups and peer-review of major written projects is encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

7.6.2 Ohio State's Academic Integrity Policy

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the University's Code of Student Conduct, and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the University's Code of Student Conduct and this syllabus may constitute "Academic Misconduct."

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as:

"Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's Code of Student Conduct is never considered an "excuse" for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University. If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Academic Integrity and Misconduct
<https://oaa.osu.edu/academic-integrity-and-misconduct>
- Eight Cardinal Rules of Academic Integrity

7.6.3 Copyright Disclaimer

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course.

Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

8. Safety and health requirements

All teaching staff and students are required to comply with and stay up to date on all University safety and health guidance, which includes wearing a face mask in any indoor space and maintaining a safe physical distance at all times. Non-compliance will be warned first and disciplinary actions will be taken for repeated offenses.

9. Accessibility Accommodations for Students with Disabilities

9.1 Requesting Accommodations

The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. SLDS contact information: slds@osu.edu; 614-292-3307; slds.osu.edu; 098 Baker Hall, 113 W. 12th Avenue.

9.2 Accessibility of Course Technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.