BADM 211: Business Analytics II
Spring 2020 Syllabus

Instructor

Vanitha Virudachalam
4014 BIF
vanitha@illinois.edu

Location & Times

130 Wohlers Hall
Tuesday + Thursday
Sec D: 9:30-10:50a
Sec E: 11a-12:20p
Sec F: 12:30-1:50p

Office Hours

TuW 3-4
or by appointment

TA Support

MTuWTh 6:30-8:20p in 3009 BIF
F 1:00-2:50p in 3001 BIF

Online Support

Piazza (via Canvas or directly at piazza.com/illinois/spring2020/badm211/home)

Prerequisites

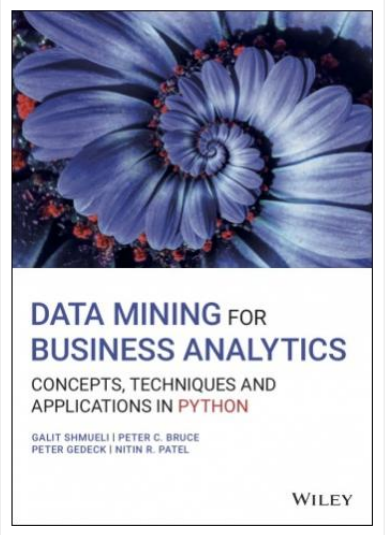
Sophomore standing
BADM 210

Course Description

Recent decades have witnessed an exponential increase in the availability of data as well as data analytics tools. In this new environment, businesses that use data wisely can discover insights, make better decisions, and run more efficiently. For example, Renaissance technologies, regarded as one of the most successful hedge funds of all time, is known for its systematic trading using quantitative models. Similarly, Netflix efficiently uses its user data to predict which movies we will like which has a huge impact in its customer retention rate of 93% which is significantly higher than its competitor Hulu (64%). Google generates billions of data each year through its targeted advertising. Therefore, no matter where your career takes you, skills in data analytics will serve you well. By getting you acquainted with data analytic tools, the statistical background of these tools, and Python, a state-of-the-art programming language, this course aims to increase your competitive advantage in your future career in this age of data and technology.

Required Materials

Textbook: *Data Mining for Business Analytics: Concepts, Techniques and Applications in Python*, Galit Shmueli, Peter C. Bruce, Peter Gedeck, and Nitin Patel (2019, Python edition)



We will be coding in **Python** using **Jupyter Notebooks**, which can be accessed using the cloud-based **Vocareum** platform.

You will need to bring a laptop to class, in order to follow along with in-class exercises and to take in-class assessments.

Online and Offline Support

The instructor and TAs are available both online and offline to answer any questions and help you master the course material. I am always available to help during office hours and by appointment, and TAs are available nearly two hours every day, as noted on the first page. For questions about the material, please use Piazza (which can be accessed via our Canvas site). This will allow multiple instructors and TAs to answer your question, as well as allowing other students to benefit from your questions. For more personal questions, please email me. *When emailing me, please include [BADM 211] in the subject line.*

Student Learning Objectives

This course introduces you to the ever-changing world of data science. We aim to give you the fundamental tools that will allow you to become comfortable exploring a data set, and to continue to grow as a data explorer even after this course ends. By the end of this semester, you will:

- Acquire statistical reasoning and understand the difference between inferential and predictive methods, the role of machine learning, and the use of regression or classification to address analytical problems.
- Analyze real, complex datasets and apply various models to describe and gain insights from this data.
- Learn various ways to construct robust linear/nonlinear predictive models that can improve business decisions.
- Learn how to communicate the results and insights from your data analysis to any audience in a variety of ways, i.e. orally, graphically, and written.
- Be able to use the programming language Python to perform business analysis.

Course Schedule

The course schedule is described on the following page. Typically, we will cover one topic each week, with the Tuesday course structured as a lecture and the Thursday course structured as a "lab" session, where we engage with the material together. Required readings as well as deadlines for pre-class quizzes and homework assignments are noted in the course schedule. I may modify this schedule as the course progresses. Any updates will be posted to Canvas.

Week	Date	Topic	Reading
1	Tu 1/21	Welcome + Introduction to Business Analytics	Ch. 1 (optional)
	Th 1/23	Introduction to Python	
2	M 1/27	**Week 2 Pre-Class Quiz Due, submit by 11:59pm**	Ch. 2 (pp. 15-55)
	Tu 1/28	Overview of Data Mining	
	Th 1/30	Overview of Data Mining	
3	M 2/3	**Week 3 Pre-Class Quiz Due, submit by 11:59pm**	Ch. 3 and part of Ch. 4 (pp. 61-106)
	Tu 2/4	Data Visualization + Exploratory Data Analysis	
	Th 2/6	Data Visualization + Exploratory Data Analysis	
4	M 2/10	**HW 1 Due, submit by 11:59pm**	
	Tu 2/11	Test 1 Review	
	Th 2/13	**Test 1 – Overview, Visualization + EDA**	
5	M 2/17	**Week 5 Pre-Class Quiz Due, submit by 11:59pm**	Parts of Ch. 5 (pp. 125-144) and Ch. 6 (pp. 161-176)
	Tu 2/18	Linear Regression	
	Th 2/20	Linear Regression Examples	
6	M 2/24	**HW 2 Due, submit by 11:59pm** **Week 6 Pre-Class Quiz Due, submit by 11:59pm**	Parts of Ch. 6 (pp. 176-179) and Ch. 4 (pp. 108-119)
	Tu 2/25	Cross Validation + Dimension Reduction	
	Th 2/27	Cross Validation + Dimension Reduction Examples	
7	M 3/2	**Week 7 Pre-Class Quiz Due, submit by 11:59pm**	Ch. 10 (pp. 251-279)
	Tu 3/3	Logistic Regression	
	Th 3/5	Logistic Regression Examples	
8	M 3/9	**HW 3 Due, submit by 11:59pm**	
	Tu 3/10	Test 2 Review	
	Th 3/12	**Test 2 – Linear Algorithms + Models**	
Spring Break – 3/14 to 3/22 – No classes			
10	M 3/23	**Week 10 Pre-Class Quiz Due, submit by 11:59pm**	Ch. 9 (pp. 217-247)
	Tu 3/24	Decision Trees, Random Forests	
	Th 3/26	Decision Trees, Random Forests Examples	
11	M 3/30	**HW 4 Due, submit by 11:59pm** **Week 11 Pre-Class Quiz Due, submit by 11:59pm**	TBD
	Tu 3/31	Boosted Trees + Extreme Gradient Boosting	
	Th 4/2	Boosted Trees + XGB Examples	
12	M 4/6	**Week 12 Pre-Class Quiz Due, submit by 11:59pm**	Read Ch. 16 and 17 (pp. 407-440)
	Tu 4/7	Time Series Forecasting	
	Th 4/9	Time Series Examples	

Week	Date	Topic	Reading
13	M 4/13	**HW 5 Due, submit by 11:59pm** **Week 13 Pre-Class Quiz Due, submit by 11:59pm**	Read Ch. 15 (pp. 375-396)
	Tu 4/14	Cluster Analysis	
	Th 4/16	Cluster Analysis Examples	
14	Tu 4/21	Work on Team Projects	
	Th 4/23	Work on Team Projects	
15	Tu 4/28	Test 3 Review	
	Th 4/30	**Test 3 - Comprehensive**	
16	Tu 5/5	Project Presentations **Project Reports Due, submit by 11:59pm**	

Grading Policy

There are five major components that determine a student's grade. These are summarized below and discussed in more detail in the subsequent sections.

Assessment Component	Points	% of Grade
Class Participation	40	~6%
Pre-Class Quizzes	40 (9 quizzes at 5 pts each, drop lowest)	~6%
Homework	100 (5 total, 20 pts each)	~15%
Test 1	75	~11%
Test 2	125	~18%
Project	100	15%
Test 3	200	29%
Total	**680**	100%

Class Participation

I will measure class participation through in-class surveys and polls. These are intended to make class more engaging and gauge your understanding of the material. You will receive credit for these simply by submitting an answer. You are allowed to miss up to two of these and still receive full credit for this component. In case of additional absences, your score will be reduced proportionately. I may use my discretion to increase your score based on active class participation.

In case of absence due to illness, emergency, or other legitimate reasons, please let me know as soon as possible, and I will work with you as necessary to make sure you do not fall behind. The complete policy regarding absences can be found at https://studentcode.illinois.edu/article1/part5/1-501/.

Pre-Class Quizzes

There will be nine "pre-class" quizzes (administered via Canvas) that must be completed prior to the start of each week. These quizzes are open book and based on that week's reading assignment. Multiple (infinite) submissions are allowed. Late submissions are not allowed, but your lowest quiz score will be dropped.

Homework Assignments

There will be a total of five homework assignments. Starting in Week 4, these homework assignments are due every other Monday at 11:59pm. Late submissions will be allowed, with 2 points deducted from your score for each day it is late. You have 2 submission attempts.

Tests

There will be three tests, all of which will be given in class and administered via Canvas. These will test you on fundamental concepts of business analytics and Python, based on the reading and lectures. Tests are *closed* book, and there will be no make-up tests.

Final Project

For the final project, you will work in teams to apply the methods you learned throughout the term on a real dataset, to build a predictive model and provide insight to a business decision-making problem. The project will be graded based on a presentation (in class), a Jupyter notebook report, and whether you meet a baseline performance metric.

Bonus Points

As part of the final project, students will be asked to build a predictive model. This model will be evaluated against a test data set not shared by the students. Students must score higher than a baseline performance measure to earn full credit on this portion of the final project. If students are able to meet an even higher target performance measure (to be determined), students can get a bonus of **up to 20 points**.

In addition, students can participate in the subject pool for the Behavioral Lab. Students can participate in up to two studies, where each study is worth 4 points. Therefore, students can earn **up to 8 points** through Behavioral Lab participation. More information will be given about how to participate around the third week of class.

Grading Scale

Your final letter grade will be determined by the total number of points you earn, according to the following scale.

Total Points	Percentage Score	Grade
633 – 680	[93, 100]	A
612 – 632	[90, 93)	A-
592 – 611	[87, 90)	B+
565 – 591	[83, 87)	B
544 – 564	[80, 83)	B-
524 – 543	[77, 80)	C+
497 – 523	[73, 77)	C
476 – 496	[70, 73)	C-
456 – 475	[67, 70)	D+
429 – 455	[63, 67)	D
408 – 428	[60, 63)	D-
0 – 407	[0, 60)	F

Technology Policies

Laptops and Software: We will regularly make use of laptops during class, and you are expected to bring them to class. To make things simpler, we will use a cloud-based platform, Vocareum, so the only required software is a web browser.

Use of Cell Phones: The use of cell phones is not allowed during the class. (This includes texting!) Cell phones should be turned off or put into the silent mode during class. In case you need to use your phone due to an urgent situation, please step outside of the classroom without disturbing your classmates.

Communication: Canvas announcements and emails from the instructor will be the primary source for information about this course. Note that this syllabus may be amended by the professor. If that occurs, an updated syllabus will be posted on Canvas.

Academic Honesty

Students are permitted to discuss homework assignments, but all work submitted should be your own. Students are *not* permitted to discuss pre-class quizzes prior to the submission deadline, nor are students permitted to discuss in-class midterm and final quizzes with students in later sections.

Academic dishonesty may result in a failing grade. It is your responsibility to familiarize yourself with the Student Code on Academic Integrity (https://studentcode.illinois.edu/article1/part4/1-401/). Do not hesitate to ask me if you are ever in doubt about what constitutes plagiarism, cheating, or any other breach of academic integrity.

Request for Special Accommodations

We are committed to providing a learning environment where students can succeed. If you require special accommodations, please contact the Disability Resources and Educational Service (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak Street, Champaign, call (217) 333-4603, or email disability@illinois.edu. We will try to meet all accommodations once the process has started. Please note accommodations are not retroactive to the beginning of the semester but begin the day you contact the professor with a current letter of accommodation from DRES.

Emergency Preparedness

Emergency response recommendations can be found at the following website: http://police.illinois.edu/emergency-preparedness/. I encourage you to review this website and the campus building floorplans website within the first week of class. Additionally, a two-minute video outlining different strategies to use in case of an emergency can be found at http://police.illinois.edu/emergency-preparedness/run-hide-fight/.