SCH-MGMT 697DS Data Science for Business

Instructor Information

Name and Title:	<PROF_FULL_NAME>; Lecturer in Applied Statistics and Computing
Email:	<PROF_EMAIL>
Phone:	Office: <PHONE>
Class Delivery:	Flex Learning Model In-person students attend classes on Tu/Th 8:30 am - 9:45am Classes will be live-streamed and recorded for online students
Office Hours:	Timing TBA Isenberg Office 327 Zoom: <LINK_ZOOM>

Course Information

Title:	Business Applications of Python
Number:	SCH-MGMT 609
Prerequisites	No prior programming experience is expected.

Class Description

Businesses, governments, and individuals create massive collections of data as a by-product of their activity. Increasingly, decision-makers and systems rely on intelligent technology to analyze data systematically in order to improve decision-making. In many cases automating analytical and decision-making processes is necessary because of the volume of data and the speed with which new data are generated.

We will examine how data analytics can be used to improve decision-making. We will study the fundamental principles and techniques of data science and data mining, and we will examine real-world examples and cases to place data-mining techniques in context, to develop data-analytic thinking, and to illustrate that proper application is as much an art as it is a science.

While the main goal of this course is to study analytic decision making at a high level, we will gain some exposure to and training in popular open-source software namely, Python

and R. Technical proficiency is not a primary objective of this course, but we will tackle exercises and opportunities to build our skills in this domain, and will naturally gain familiarity with several important technical competencies. Some exercises will require the use of Tableau software which can be accessed in the classroom and through the Isenberg Virtual Desktop.

After taking this course you should:

1. *Approach business problems data-analytically.* Think carefully & systematically about whether & how data can improve business performance, to make better-informed decisions for management, marketing, investment, etc.

2. *Be able to interact competently on the topic of data mining for business analytics.* Know the fundamental principles of data science, that are the basis for data mining processes, algorithms, & systems. Understand these well enough to work on data science projects and interact with everyone involved. Envision new opportunities.

3. *Have had hands-on experience mining data.* Be prepared to follow up on ideas or opportunities that present themselves, e.g., by performing pilot studies.

Class Materials

Required: The textbook for the class will be

(DSFB) *Data Science for Business: What you need to know about data mining and data analytic thinking Provost & Fawcett (O'Reilly, 2013).*

Optional: Additional materials that may be useful

Data Science from Scratch, 2nd Edition by Joel Grus, May 2019; Publisher(s): O'Reilly Media, Inc.; ISBN: 9781492041139

A Practical Introduction to Python Programming,
By Brian Heinold © 2012, Department of Mathematics and Computer Science Mount St. Mary's University, Licensed under Creative Commons

Python for Data Analysis, 2nd Edition, Wes McKinney. October 2017 (O'Reilly). Available online.

Elements of Statistical Learning, 2nd Edition, Trevor Hastie, Robert Tibshirani and Jerome Friedman. 2nd Edition, 2009 (Springer). Available free online.

Tentative Schedule

Week	Topics	Class Prep.	Assignments
1	Foundations: Summarizing and Visualizing Data (Tableau Lab)	Videos and notes provided	Quiz 1
2	Foundations: Data analytics with open-source tools (R and Python Labs)	Videos and notes provided	Quiz 2 Assignment 1
3	Introduction to Predictive Modeling **Case: Data science for managing churn in wireless telecom**	DSFB ch.1-2	Quiz 3
4	Predictive Modeling I - Supervised Segmentation **Case: Predicting Employee Attrition**	DSFB ch. 3	Quiz 4 Assignment 2
5	Predictive Modeling 2 - Regression Models **Case: Predicting Sales from Product Characteristics**	DSFB ch. 4	Quiz 5
6	Model performance analytics I - Fitting the data and overfitting the data, holdout testing, cross-validation, "regularization", learning curves, domain knowledge validation. **Project Introduction** (groups of 1-4)	DSFB ch. 5	Quiz 6 Assignment 3
7	**Take-home Exam** (Informal help sessions and appointments replace class meetings)		
	--- Spring Break ---		
9	Predictive Modeling (cont.) - Putting it all together **Case: Data Mining for Operations Support**	DFSB ch. 7	Quiz 7
10	Model performance analytics II - Ranking, Profit, Lift ROC analysis, expected value framework **Case: Modeling consumer behavior for targeted marketing (banking and/or online advertising)**	DFSB ch. 8	Quiz 8 Assignment 4
11	Similarity, Distance, Nearest Neighbors, Clustering **Case: IBM Salesforce Optimization**	DFSB ch. 6	Quiz 9
12	Toward Analytical Engineering **Possible Case Studies: Targeted Marketing Revisited; Telecom Churn Revisited; GE Capital**	DFSB ch. 11	Quiz 10 Assignment 5
13	Final Presentations		Projects

Evaluation

Upon completion of this course, you will be awarded a letter grade based on the following criteria. Individual grades will be based on an average calculated as follows:

Type of assessment	**Weight**
Class participation, interaction, and professionalism	10%
Assignments (5 total)	20%
Quizzes (10 total)	20%
Midterm Exam	20%
Final Project	30%

*The lowest quiz grade will be dropped, that is 10 of 11 will be counted.

Grading Scale

Individual grades will be based on the scale shown below:

A	93-100%	C+	77-79%
A-	90-92%	C	73-76%
B+	87-89%	C-	70-72%
B	83-86%	D	60-69%
B-	80-82%	F	<59%

Types of Assessments Explained

Class participation, interaction, and professionalism

Be prepared for class discussions by having satisfied yourself that you understand what we have done in the prior classes. The assigned readings will cover the fundamental material. The class meetings will be a combination of lectures/discussions on the fundamental material, discussions of business applications of the ideas and techniques, case discussions, student exercises, and demos. You are expected to attend every class session or watch the recorded lecture. At times, small class exercises or questionnaires will be administered to measure participation and class preparation.

Assignments

Assignments for this course are designed to assess your ability to apply the content covered in previous class to various business settings. Most assignments will involve the completion of analysis tasks and interpretation of results. Some exercises will assess your competencies

in the use of Tableau, Python, and/or R. The format of the assignments will differ from week to week, but many will take the form of a Google Colab notebook.

Quizzes

Weekly quizzes will cover the content of the previous week. They will contain anywhere from 5 to 12 questions presented in a multiple choice, true/false, or fill in the blank format. Quizzes will be taken over a period of 4 days outside of class time and will be administered through Blackboard.

Midterm Exam

The exam will consist of written exercises that will require you to demonstrate an understanding of the concepts and tools covered in the preceding weeks. This will be a chance for you to receive some detailed feedback. The exam will be between 3 and 4 questions similar to the problems in the assignments.

Final Project

You will be allowed some flexibility with your final project. Some may choose to complete an exercise in which they pursue an area of interest using their own data or data derived from an internet source such as Kaggle. You will be asked to construct and interpret the results of a predictive model using the techniques covered in class while meeting certain requirements which will be explained at the time of the project introduction. One goal of this project is to develop a professional-looking product to serve as tangible evidence of your data analysis and interpretation abilities.

Late Policy

Any work submitted after its deadline will automatically be given a grade of zero unless there has been communication between the student and instructor. Reasonable extensions of 1-2 days will nearly always be granted if arranged in advance. Assignments with deadlines prior to an exam will not be accepted after the exam due date under any circumstances.

General Class Expectations and Information

Communication

Be sure to check email and Blackboard every day. If you email me, I will respond within 24 hours on weekdays and within 48 hours on weekends. In the rare case that you do not hear back from me within the expected time-frame, please feel free to email again. I will not use the messaging system in Blackboard.

Accommodation Statement

The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning

disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodations to help you succeed in this course. If you have a documented disability that requires an accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements. For further information, please visit Disability Services (https://www.umass.edu/disability/)

Academic Honesty Statement

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is not normally sufficient evidence of lack of intent (http://www.umass.edu/dean_students/codeofconduct/acadhonesty/).

Technical/Computer Support:

UMassOnline offers technical support for this class 24 hours a day, 7 days a week online at the Help Center or call: <PHONE>.

Student Support

In these challenging and uncertain times, many are struggling with mental health. In a recent survey of UMass students, 35% reported symptoms of anxiety and/or depression. The UMass counseling center is an incredible resource for students who are struggling. I highly recommend keeping this resource in mind if you feel you could use some support at any time. https://www.umass.edu/counseling/ or call <PHONE>.