SYRACUSE UNIVERSITY
WHITMAN SCHOOL OF MANAGEMENT

Course Syllabus
Revised 8/26/2019

SCM 651 – Business Analytics **Fall 2019**

Professor: Don Harter
Office: Whitman School room 517
Office Phone: (315) 443-3502
E-mail: dharter@syr.edu

Classes: Section M002: Friday – 9:30 AM – 12:15 PM
Section M001: Friday – 12:45 PM – 3:30 PM
Whitman School of Management: Room 002

Web Page: BlackBoard site at: http://blackboard.syr.edu/

Office hours: Tuesday & Wednesday 3:00-4:00 or by appointment

Textbook: Microsoft Excel Data Analysis and Business Modeling (Winston (recommended)
Customized course material will be distributed during the semester

Course Description: Business analytics including advanced spreadsheets; relational database and SQL queries; statistical analysis in R including multi-linear regression, interactions, tests for regression assumptions, logit, probit; neural networks; and dashboards.

Prerequisite: None

Audience: This course is intended for the graduate student who is interested in developing a portfolio of skills in business analytics.

Credits: 3.0 semester credits

Learning Objectives:

The course learning objectives include:

1. Data collection: using tools to collect and organize data (e.g., Google Analytics)
2. Data analysis: identify patterns in the data via visualization, statistical analysis, and data mining
3. Strategy and decisions: develop alternative strategies based on the data
4. Implementation: develop a plan of action to implement the business decisions

Class discussions will be based on case situations and on articles from business and technical publications. The class will include substantial hands-on work in data collection, analysis and interpretation.

Course Format

Classes will include a mixture of lectures, lab sessions, and case discussions. The course readings will serve as the basis for lectures on basic business analytics. Lab sessions focus on learning skills required for data analysis.

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Grading

Grades will be based on four components:

1. Homework assignments (40%): There are 5 homework assignments focusing on the skills necessary to perform business analytics. Homework assignments are to be completed as a group assignment. No collaboration between teams is allowed on group assignments. Submitted assignments must be original work from the team.
2. Final Exam (46%): The final exam is an individual assignment. No discussion or collaboration with anyone else is allowed. Exam submissions must be original work from the individual. The exam is an in class exam on the official final exam date for the course, determined by the registrar.
3. Weekly participation (14%): A Kahoot session at the end of each class will count for the weekly score. You must be in class to participate. Each Kahoot session is worth 1%.

Assignments

Assignment	Individual or Group	Percent	
		Individual	Group
1. Pivot tables, correlation, regression (MS Excel)	Group		8 %
2. Linear and non-linear regression, optimization (MS Excel)	Group		8 %
3. Google analytics and database queries	Group		8 %
4. Choice models (logit, probit), moderating effects	Group		8 %
5. Modeling and testing model assumptions	Group		8 %
6. Final Exam	Individual	46 %	
7. Weekly participation	Individual	14 %	
	Total	**60 %**	**40%**

Grading Curve

The projected grading curve is shown below. This curve may be adjusted depending on the class performance. The lower end of each grade range will not be raised (e.g., 95% will be an A, 92% will be at least an A-, etc.).

Grade Distribution	
A	95.0 – 100.0
A-	92.0 – 94.99
B+	90.0 – 91.99
B	82.0 – 89.99
B-	75.0 – 81.99
C+	72.0 – 74.99
C	65.0 – 71.99
C-	60.0 – 64.99
F	0.0 – 59.99

If a student requests that part of an assignment be re-graded, then the entire assignment will be re-graded. Historically, half of re-grades increase the score, half decrease the score.

University and School Policies

Academic integrity policy

Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered as described in the Violation and Sanction Classification Rubric. Syracuse University students are required to read an online summary of the University's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check- in on MySlice.

The Violation and Sanction Classification Rubric establishes recommended guidelines for the determination of grade penalties by faculty and instructors, while also giving them discretion to select the grade penalty they believe most suitable, including course failure, regardless of violation level. Any established violation in this course may result in course failure regardless of violation level.

A violation of the academic integrity policy, use of work not your own, or collaboration with others will result in a grade of zero on any assignment or exam where a violation is identified and will be reported to the academic integrity office.

Work produced by students as part of this course may be used for educational purposes

I intend to use academic work that you complete this semester in this course during this semester or in subsequent semesters for educational purposes. Your registration and continued enrollment constitute your permission. Before using your work for that purpose, I will render the work anonymous by removing identifying material.

Disability services

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. I invite any student to meet with me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Office of Disability Services (ODS) in this process.

If you would like to discuss disability-accommodations or register with ODS, please visit their website at http://disabilityservices.syr.edu. Please call (315) 443-4498 or email disabilityservices@syr.edu for more detailed information.

ODS is responsible for coordinating disability-related academic accommodations and will work with the student to develop an access plan. Since academic accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible to begin this process.

Discrimination or Harassment

The University does not discriminate and prohibits harassment or discrimination related to any protected category including creed, ethnicity, citizenship, sexual orientation, national origin, sex, gender, pregnancy, disability, marital status, age, race, color, veteran status, military status, religion, sexual orientation, domestic violence status, genetic information, gender identity, gender expression or perceived gender.

Any complaint of discrimination or harassment related to any of these protected bases should be reported to Sheila Johnson-Willis, the University's Chief Equal Opportunity & Title IX Officer. She is responsible for coordinating compliance efforts under various laws including Titles VI, VII, IX and Section 504 of the Rehabilitation Act. She can be contacted at Equal Opportunity, Inclusion, and Resolution Services, 005 Steele Hall, Syracuse University, Syracuse, NY 13244-1120; by email: titleix@syr.edu; or by telephone: 315-443-0211.

Email Policy

Syracuse University has established email as a primary vehicle for official communication with students, faculty, and staff. Emergency notifications, educational dialog, research, and general business correspondence are all consistently enhanced in institutions of higher learning where email policies exist and are supported by procedures, practice, and culture.

An official email address is established and assigned by Information Technology Services (ITS) for each registered student, as well as for all active faculty and staff members. All University communications sent via email will be sent to this address. Faculty and staff members must use the officially established University email address to communicate with students registered in their classes.

Faith Tradition Observances

Syracuse University does not set aside days for any religious holiday. **Students must notify instructors by the end of the second week of classes** for regular session classes and by the submission deadline for flexibly formatted classes when they will be observing their religious holiday(s). Students will have access to an online notification form through MySlice for two weeks beginning on the first day of class.

Syracuse University's religious observances policy, found at:

http://supolicies.syr.edu/emp_ben/religious_observance.htm

recognizes the diversity of faiths represented in the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students should have an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors no later than the end of the second week of classes for regular session classes and by the submission deadline for flexibility formatted classes. Student deadlines are posted in MySlice under Student Services/Enrollment/My Religious Observances/Add a Notification. Instructors may access a list of their students who have submitted a notification in the MySlice Faculty Center. Note that the religious observances icon will not appear unless a student in that class has submitted a notification.

Trigger Warning

Because of the nature of the topics covered in this class, the course readings or class discussions may generate intellectual and emotional discomfort. These responses are natural parts of intellectual growth. If, however, your emotional response becomes acute psychological distress (triggering), please communicate with me. I invite you to contact me if you have concerns in this regard.

ORANGE ALERT

ORANGE ALERT, Syracuse University's crisis notification system, uses text messages, phone, and email alerts to provide rapid notification and instructions to members of the University community in the event of a crisis in progress. Crises could include an individual who is considered armed and dangerous, a hazardous materials incident, an explosion, or any other event in which there is an immediate threat of physical harm or death to campus community members. We recognize that faculty may consider activated cell phones as an interruption to their class. However, the public safety department recommends that faculty members leave their own cell phones on vibrate in order to receive text messages about a potential emergency situation. It is also recommended that faculty designate several class members to leave their cell phones on vibrate in order to receive notifications in the event of a critical incident. ORANGE ALERT contact information for students, faculty, and staff is drawn from the MySlice online information system; please keep your contact information current.

In the event of an emergency

- Phone emergency line from on-campus: 711
- Phone emergency line from off-campus: 443.2224
- Phone emergency line from cell phone providers ATT/Verizon/Nextel: #78

For complete details on emergency procedures, visit: http://emergencyguide.syr.edu/.

Final Exam

Examination days and times are assigned by the Registrar and may not be changed. Exam times appear at *http://www.syr.edu/registrar/students/finalexams* and are available in MySlice/Faculty Center/My Exam Schedule. Reasons to change do not include student preferences (even if there is an earlier exam), nor as an accommodation for student travel.

Professionalism

To maintain a level of professionalism, cell phone usage is not permitted during regular class lectures sessions; laptops will be used for lab sessions but are not to be used during guest speaker presentations.

Other Issues

- For fairness reasons, there will be no additional assignment for extra credit. The best way to achieve a good grade is to put decent effort into each assignment when it comes.
- We will use the Whitman BlackBoard (http://blackboard.syr.edu/) as the class website. Students are expected to visit this website regularly for important announcements.

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Class Schedule

Business Analytics		
Session	**Assignment**	**Reading/Downloads**
Session 1 Friday August 30		**Course Background** • What is Business Analytics? • How can Business Analytics be applied? • Who uses Business Analytics? **Review of syllabus and assignments** **Managerial Analytics (Watson, Nelson)** **Practitioner's Guide (Bartlett)**
Session 2 Friday September 6		**Excel: Data Visualization** • Navigation • Calculations and auditing • Graphs • Lookup • Sorting • Filters • Pivot Tables and Charts **Excel: Statistical Analysis** • Financials • Descriptive Statistics • Correlation • Regression (linear, non-linear)
Session 3 Friday September 13	**Homework #1 Overview** Team formation finalized	**Excel: Sensitivity Analysis** • Prediction models • Sensitivity Analysis & Conditional Formatting **Access: Data base structure and queries** • Importing data • Relationships between tables • Solving dirty data problems • Queries with Query Design
Session 4 Friday September 20		**Database queries** • SQL
Session 5 Friday September 27		**Excel: Power Pivot & Power Query**
Session 6 Friday October 4	**Homework #1:** **Data representation and analysis** (group assignment) **Due at 8:00 AM; submit via BlackBoard**	**Homework #1 discussion** **Optimization** • Unconstrained optimization • Constrained optimization • Complex scenario optimization with multiple constraints • Multiple start point optimization to overcome local optima

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Session	Assignment	Reading/Downloads
Session 7 Friday October 11		**Google Analytics** • Traffic flow from sources • Geographic analysis

Session 8
Friday
October 18
	Homework #2:
	Data analysis and modeling
	(group assignment)
	Due at 8:00 AM; submit via BlackBoard
		Homework #2 discussion
		
		Business Analytics with R
		• Data visualization
		  ○ Histograms, boxplots, scatterplots
		  ○ 3-D plots by factors
		• Statistical summaries
		  ○ Descriptive statistics
		  ○ Correlations
		• ANOVA
		• Linear and non-linear regression
		  ○ Dummy variables
		• Interactions (moderating effects)

Session 9
Friday
October 25
		Business Analytics with R
		• Regression diagnostics
		  ○ Linearity
		  ○ Multi-collinearity
		  ○ Heteroscedasticitiy
		  ○ Serial Correlation
		  ○ Outliers
		• Corrections for regression violations
		  ○ Box-Cox, Box-Tidwell
		  ○ Factor analysis
		• Benford's Law
		• Decision trees

Session 10 Friday November 1	**Homework #3:** **Data acquisition and analysis** (group assignment) **Due at 8:00 AM; submit via BlackBoard**	**Homework #3 discussion** **Business Analytics with R** • Logit • Probit • Perceptrons • Neural Networks ○ Deep learning • Support Vector Machines
Session 11 Friday November 8		**Business Analytics with R** • Advanced topics
Session 12 Friday November 15	**Homework #4:** **Logit & Probit** (group assignment) **Due at 8:00 AM; submit via BlackBoard**	**Homework #4 discussion** **Tableau** Tableau's data visualization software is provided through the Tableau for Teaching program.

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Session	Assignment	Reading/Downloads
Session 13 Friday November 22		**Power BI**
November 29	**Thanksgiving break**	**No Class**
Session 14 Friday December 6	**Homework #5: Special Topics Homework** (group assignment) **Due at 8:00 AM; submit via BlackBoard**	**Homework #5 discussion** **Special topics** **Course Review**
Final Exam	**Section M001** Friday, December 13 **Section M002** Friday, December 13	**In Class Final Exam** **(date subject to change)**

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Reference Textbooks:

Business Analytics (general)

1. "Managerial Analytics: An Applied Guide to Principles, Methods, Tools, and Best Practices," December 2013, 1st Edition, Watson and Nelson (recommended)
2. "A Practitioner's Guide to Business Analytics: Using Data Analysis Tools to Improve Your Organization's Decision Making and Strategy," 2013, Bartlett (recommended)
3. "Predictive Business Analytics: Forward Looking Capabilities to Improve Business Performance," 2014, Maisel, Cokins
4. "Big Data and Business Analytics," 2013, Jay Liebowitz
5. "Big Data Analytics with R and Hadoop," 2013, Vignesh Prajapati
6. "Competing on Analytics: The New Science of Winning," 2007, Thomas H. Davenport
7. "Business Intelligence," 2011, Jerzy Surma
8. "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses," 2013, Minelli, Chambers
9. "Big Data Analytics: Disruptive Technologies for Changing the Game," 2013, Arvind Sathi
10. "Predictive Analytics: The Power to Predict Who Will Click, Buy, Lie, or Die," 2013, Siegel, Davenport
11. "Modeling Techniques in Predictive Analytics: Business Problems and Solutions with R," 2013, Thomas W. Miller
12. "Decision Analytics: Microsoft Excel," 2013, Conrad Carlberg
13. "Data Science for Business: What you need to know about data mining and data-analytic thinking," 2013, Provost, Fawcett
14. "Getting Started with Business Analytics: Insightful Decision-Making," 2013, Hardoon, Shmueli
15. "Win with Advanced Business Analytics: Creating Business Value from Your Data," 2012, Isson, Harriott

Data Visualization

1. "The Visual Display of Quantitative Information," 2001, Edward R. Tufte
2. "Now You See It: Simple Visualization Techniques for Quantitative Analysis," 2009, Stephen Few
3. "An Introduction to R for Spatial Analysis and Mapping," 2015, Chris Brunsdon, Lex Comber

Statistics

1. "R for Everyone: Advanced Analytics and Graphics," 2013, Jared P. Lander
2. "R for Business Analytics," 2012, A. Ohri
3. "Introductory Statistics with R," 2008, Peter Dalgaard
4. "Discovering Statistics Using R," 2012, Field, Miles, Field

Dashboards

1. "Microsoft Excel Dashboards and Reports," 2013, Michael Alexander & John Walkenbach
2. "Dashboarding and Reporting with Power Pivot and Excel," 2014, Kasper de Jonge
3. "Communicating Data with Tableau," 2014, Ben Jones
4. "Tableau Your Data!" 2013, Dan Murray
5. "Tableau 8: The Official Guide," 2013, George Peck

SQL

1. "SQL in 10 Minutes, Sams Teach Yourself," 2012, Ben Forta
2. "SQL Database for Beginners," 2014, Martin Holzke, Tom Stachowitz
3. "SQL Quickstart Guide: The Simplified Beginner's Guide to SQL," 2015, ClydeBank Technology
4. "SQL Guide (Quickstudy: Computer) Pamphlet," 2005, Inc. BarCharts

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Data Mining

1. "Data Mining and Business Analytics with R," 2013, Johannes Ledolter
2. "Data Mining Applications with R," 2013, Yanchang Zhao, Yonqhua Cen
3. "R and Data Mining: Examples and Case Studies," 2012, Yanchang Zhao
4. "Data Mining with R: Learning with Case Studies," 2010, Luis Torgo
5. "Data Mining: Practical Machine Learning Tools and Techniques," 2011, Witten, Frank, Hall
6. "RapidMiner: Data Mining Use Cases and Business Analytics Applications," 2013, Hofmann, Klinkenberg
7. "Data Mining for the Masses," 2012, Matthew A. North
8. "Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner," 2010, Shmueli, Patel, Bruce

Google Analytics

1. "Sams Teach Yourself Google Analytics in 10 Minutes," 2011, Michael Miller
2. "Advanced Web Metrics with Google Analytics," 2012, 3rd Edition, Brian Clifton
3. "Google Analytics," 2010, Justin Cutroni
4. "Web Analytics 2.0: The Art of Online Accountability and Science of Customer Centricity," 2009, Avinash Kaushik

Accounting Analytics

1. "Forensic Analytics: Methods and Techniques for Forensic Accounting Investigations," 2011, Mark Nigrini
2. "Using Analytics to Detect Possible Fraud: Tools and Techniques," 2013, Pamela S. Mantone

Entrepreneurship Analytics

1. "Lean Analytics: Use Data to Build a Better Startup Faster," 2013, Croll, Yoskovitz

Marketing Analytics

1. "Cutting Edge Marketing Analytics: Real World Cases and Data Sets for Hands On Learning," to be published May 2014, Venkatesan, Farris, Wilcox
2. Customer and Business Analytics: Applied Data Mining for Business Decision Making Using R," 2012, Putler, Krider
3. "Marketing Analytics: Data-Driven Techniques with Microsoft Excel," 2014, Wayne L. Winston
4. "Marketing Analytics: Strategic Models and Metrics," 2013, Stephan Sorger
5. "Digital Marketing Analytics: Making Sense of Consumer Data in a Digital World," 2013, Hemann, Burbary
6. "Principles of Marketing Engineering," 2012, Lilien, Rangaswamy, DeBruyn

Supply Chain Analytics

1. "Supply Chain Planning and Analytics: The Right Product in the Right Place at the Right Time," 2011, Gerald Feigin