SYRACUSE UNIVERSITY

**WHITMAN SCHOOL OF MANAGEMENT**

# Course Syllabus

Updated 1/22/2022

## SCM 651 – Business Analytics Spring 2022

**Professor:** Don Harter

Office: Whitman School room 517

Office Phone: (315) 443-3502

E-mail: dharter@syr.edu

**Classes:**  Whitman School of Management, Room 002 and via Zoom

**Class Time:** Section M001: Friday 9:30 AM – 12:15 PM Eastern, 1/28/2022 to 4/29/2022

Section M002: Friday 12:45 PM – 3:30 PM Eastern, 1/28/2022 to 4/29/2022

Both sections will have the option of in-person attendance or online live via Zoom

**Final Exam:** You must take the exam with your section.

Section M001: May 9, 2021, 12:45 PM – 2:45 PM

Section M002: May 9, 2021, 10:15 AM – 12:15 PM

The final exam date and time are set by the registrar and cannot be changed.

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

**Office hours:** All office hours are via Zoom at the following times, other times by appointment.

Monday, Tuesday, Wednesday, Thursday: 9:00 AM to 10:00 AM Eastern Time

**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, model selection; 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.

**Textbooks:** Customized course material will be used in the semester. No books are required – no books need to be purchased.

**Software:** All software is available via free download or is accessible via remote access.

# 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.

## Grading

Grades will be based on four components:

1. Homework assignments (50%): 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. Each student must submit answers to BlackBoard. Late assignments score zero.
2. Final Exam (50%): 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 online exam on the official final exam date and time for the course, determined by the registrar.

**Assignments**

|  |  |  |  |
| --- | --- | --- | --- |
| **Assignment** | **Individual**  **or Group** | **Percent** | |
| Individual | Group |
| 1. Pivot tables, correlation, regression | Group |  | 10% |
| 2. Linear and non-linear regression, optimization | Group |  | 10% |
| 3. Google Analytics & MS Access queries | Group |  | 10% |
| 4. Regression assumptions & model selection | Group |  | 10% |
| 5. Logit, probit, moderating effects | Group |  | 10% |
| 6. Final Exam | Individual | 50% |  |
|  | **Total** | **50%** | **50%** |

**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 |

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.

**Syracuse University Policies:**

Syracuse University has a variety of other policies designed to guarantee that students live and study in a community respectful of their needs and those of fellow students.

**University Attendance Policy**

Attendance in classes is expected in all courses at Syracuse University. Students are expected to arrive on campus in time to attend the first meeting of all classes for which they are registered. Students who do not attend classes starting with the first scheduled meeting may be academically withdrawn as not making progress toward degree by failure to attend. Instructors set course-specific policies for absences from scheduled class meetings in their syllabi.

**Accessibility and Disability-Related Accommodations**

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 contact me to discuss strategies and/or accommodations (academic adjustments) that may be essential to your success and to collaborate with the Center for Disability Resources (CDR) in this process.

If you would like to discuss disability-accommodations or register with CDR, please visit [Center for Disability Resources](https://disabilityservices.syr.edu/). Please call (315) 443-4498 or email [disabilityresources@syr.edu](mailto:disabilityresources@syr.edu) for more detailed information.

The CDR 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 CDR as soon as possible to begin this process. <https://disabilityresources.syr.edu/>

**Discrimination or Harassment**

Federal and state law, and University policy prohibit discrimination and harassment based on sex or gender (including sexual harassment, sexual assault, domestic/dating violence, stalking, sexual exploitation, and retaliation). If a student has been harassed or assaulted, they can obtain confidential counseling support, 24-hours a day, 7 days a week, from the [Sexual and Relationship Violence Response Team](https://ese.syr.edu/bewell/sexual-and-relationship-violence/) at the Counseling Center (315-443-8000, Barnes Center at The Arch, 150 Sims Drive, Syracuse, New York 13244). Incidents of sexual violence or harassment can be reported non-confidentially to the University’s Title IX Officer (Sheila Johnson Willis, 315-443-0211, [titleix@syr.edu](mailto:titleix@syr.edu), 005 Steele Hall). Reports to law enforcement can be made to the University’s Department of Public Safety (315-443-2224, 005 Sims Hall), the Syracuse Police Department (511 South State Street, Syracuse, New York, 911 in case of emergency or 315-435-3016 to speak with the Abused Persons Unit), or the State Police (844-845-7269). I will seek to keep information you share with me private to the greatest extent possible, but as a professor I have mandatory reporting responsibilities to share information regarding sexual misconduct, harassment, and crimes I learn about with the University’s Title IX Officer to help make our campus a safer place for all.

**Faith Tradition Observances**

[Syracuse University’s Religious Observances Policy](https://policies.syr.edu/policies/university-governance-ethics-integrity-and-legal-compliance/religious-observances-policy/) 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 traditions. 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.

**Policy on Faculty Use of Student Academic Work**

Academic work completed during a semester may be used by professors for educational purposes in courses during the semester. Students’ registration and continued enrollment constitute consent for this purpose. Before using students’ work for educational purposes in subsequent semesters, professors will either request students’ permission in writing and render the work anonymous by removing all personal identification.

**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. You can read what students need to know here: <https://class.syr.edu/academic-integrity/policy/>

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. SU 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.

All academic integrity expectations that apply to in-person quizzes and exams also apply to online quizzes and exams. In this course, all work submitted for quizzes and exams must be yours alone. Discussing quiz or exam questions with anyone during the quiz or exam period violates academic integrity expectations for this course.

Using websites that charge fees or require uploading of course material (e.g., Chegg, Course Hero) to obtain exam solutions or assignments completed by others and present the work as your own violates academic integrity expectations in this course.

**Use of Class Materials and Recordings**

Original class materials (handouts, assignments, tests, etc.) and recordings of class sessions are the intellectual property of the course instructor. You may download these materials for your use in this class. However, you may not provide these materials to other parties (e.g., web sites, social media, other students) without permission. Doing so is a violation of intellectual property law and of the student code of conduct.

**Class Schedule**

The topics, readings and assignments for each class session are listed on the following pages. The syllabus will be expanded with additional details throughout the semester. Special topics will be added to the schedule as time permits.

**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.

**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.**Class Schedule**

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| --- | --- | --- |
| **Business Analytics** | | |
| Session | **Assignment** | **Reading/Downloads** |
| **Session 1** Friday  January 28  48 pages |  | **Course Background**   * What is Business Analytics? * How can Business Analytics be applied? * Who uses Business Analytics?   **Review of syllabus and assignments** |
| Session 2 Friday  Feb 4  33 pages |  | **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  Feb 11  27 pages |  | **Excel: Sensitivity Analysis**   * Forecasting * Prediction models * Sensitivity analysis * Conditional formatting * Scenario manager   **Excel: Data Manipulation**   * Tables * Math and text operators * Index & Match   **Excel: Analysis**   * 3D graphs |
| Session 4 Friday  Feb 18  27 pages |  | **Optimization**   * Goal Seek * Unconstrained optimization * Constrained optimization * Optimization options   + Linear (Simplex)   + GRG non-linear   + GRG non-linear with multi-start   + Evolutionary |

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| --- | --- | --- |
| **Session** | **Assignment** | **Reading/Downloads** |
| Session 5 Friday  Feb 25  31 pages | Homework #1:Pivot tables, correlation, regression (group assignment, submitted individually)  **Due at 8:00 AM Eastern Friday, Feb 25, 2022;** submit via BlackBoard | **Access: Data base structure and queries**   * Importing data * Relationships between tables * Solving dirty data problems * Queries with Query Design |
| Session 6 Friday  March 4  34 pages |  | **Database queries**   * SQL |
| Session 7 Friday  March 11  33 pages | Homework #2:Linear and non-linear regression, optimization (group assignment, submitted individually) Due at 8:00 AM Eastern Friday, March 11, 2022; submit via BlackBoard | **Excel: Analysis**   * Power Query * Power Pivot |
| Spring Break Friday  March 18 |  |  |
| Session 8 Friday  March 25  37 pages |  | **Google Analytics**   * Traffic flow from sources * Geographic analysis * Google AdWords campaigns * Benchmarking |
| Session 9 Friday  April 1  34 pages |  | **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) |

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| **Session** | **Assignment** | **Reading/Downloads** |
| Session 10 Friday  April 8 40 pages | **Homework #3:**  **Google Analytics &**  **MS Access queries**  (group assignment, submitted individually) Due at 8:00 AM Eastern Friday, April 8, 2022; submit via BlackBoard | **Business Analytics with R**   * Regression diagnostics   + Linearity   + Multi-collinearity   + Heteroscedasticitiy   + Serial Correlation   + Outliers * Corrections for regression violations   + Box-Cox, Box-Tidwell   + Factor analysis   + Huber regression   + Prais-Winsten * Benford’s Law * Decision Trees * K-means clustering |
| Session 11 Friday  April 15  40 pages |  | **Business Analytics with R**   * Logit * Probit * Prediction models * Perceptrons * Neural Networks |
| Session 12 April 22  29 pages | **Homework #4:**  **Regression Assumptions & Model Selection**  (group assignment, submitted individually) Due at 8:00 AM Eastern Friday, April 22, 2022; submit via BlackBoard | **Tableau dashboards**  Tableau's <a href="<http://www.tableau.com/data-visualization-software>">data visualization software</a> is provided through the Tableau for Teaching program |
| Session 13 April 29 18 pages |  | **MS Power BI dashboards**  **Course Summary**  **Final Exam Review** |
| **No Class**  Friday  May 6 | **Homework #5:**  **Logit, Probit, Moderating Effects**  (group assignment, submitted individually) Due at 8:00 AM Eastern Friday, May 7, 2022; submit via BlackBoard |  |
| **Final Exam** |  | **Schedule**  You must take the exam with your section.  Section M001: May 9, 2021, 12:45 PM – 2:45 PM  Section M002: May 9, 2021, 10:15 AM – 12:15 PM  The final exam date and time are set by the registrar and cannot be changed. |

**Reference Textbooks:**

**Business Analytics (general)**

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

**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,” 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