



ISM 645: Principles of Predictive Analytics

Fall 2019

Bryan School of Business and Economics

Department of Information Systems & Supply Chain Management

Contact Information Instructor: Jiyong Park

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Office Hours: 5:00 p.m. – 6:30 p.m. Tuesday, or by appointment

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Catalog Description

Predictive analytics aims at exploring and analyzing the large volume of data to predict relationships and generate insights for business organizations. Principles, models, and methods of predictive analytics are discussed.

Detailed Description

The recent explosion of digital data potentially could provide the new business opportunities by revealing and predicting useful information about customers, products, competitors, and economic trends. Predictive analytics involves the art of data exploration, visualization, and communication as well as the science of analyzing large quantities of data in order to discover meaningful patterns and generate insights to support decision-making. The primary objective of this course is to introduce various techniques available to extract useful information from the large volume of data an organization can use. Through this course, students will become more competent in extracting the business value from the rich data. This course will cover the concepts, principles, methodologies, and emerging trends in data mining and predictive analytics.

Course Learning Objectives

Upon completing this course, students will have a useful experience with some leading analytics software and build their analytical capabilities to use data for business decision-making. Specific outcomes are:

1. Demonstrate an understanding of the principles of predictive analytics
 2. Identify, design and assess different predictive analytics methodologies
 3. Prepare and formulate data collection, preprocessing, and exploration for analytical purposes
 4. Apply and assess different predictive analytic models and techniques
 5. Evaluate organizational implications of the use and implementation of predictive analytics
 6. Demonstrate proficiency in the use of analytics software
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Course Website

All information and materials pertaining to this course will be available on the Canvas system (<https://uncg.instructure.com/>). You will be responsible for any information or announcements contained in the email or updates on Canvas. All graded materials will be submitted electronically on Canvas.

Course Materials

This face-to-face course will be taught in seminar-style, and will consist of lectures and computer-based exercises. A major emphasis will be on hands-on software exercises on datasets. Thus you need to bring your laptop in every class. All teaching materials including lecture notes, assignments and other learning resources (including videos and reading materials) needed for this course are available on Canvas.

A. Required Textbook

- *Data Mining for Business Analytics: Concepts, Techniques, and Applications in R*, 1e, by Galit Shmueli, Peter Bruce, Inbal Yahav, Nitin Patel, and Kenneth C Lichtendahl Jr.. Wiley, ISBN-13: 978-1118879368 (Recommended buying on Amazon.com)
- Lecture notes based on the textbook will be provided on Canvas.

B. Optional Textbook

- *Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking*, by Foster Provost and Tom Fawcett, O'Reilly, ISBN-13: 978-1449361327

Software Needed for the Course

This course makes extensive use of R, a free open-source software for statistical computing and graphics, which is widely used by both academia and industry. R software is one of the top languages for statistical modeling, data mining, and predictive analytics. RStudio is a user friendly environment for R that has become popular. This software can be accessed via the UNCG's mycloud (<https://mycloud.uncg.edu>). Instructions as how to do that will be on Canvas. You can also get your own personal copy on the websites (www.r-project.org for R software and www.rstudio.com/products/RStudio for R Studio).

In addition to R, SAS is also popular in industry. Thus, supplementary materials will be provided (mostly online) to introduce how to implement some predictive analytics techniques we will cover using SAS® Enterprise Miner™ 14.3, which is part of SAS 9.4. **Note that the primary software is R and the use of SAS is optional.** This software can be accessed via the UNCG's mycloud. You can also get your own personal copy of SAS 9.4 and SAS® Enterprise Miner™ and install them on your machine. The instruction for getting your personal copies can be found at <https://its.uncg.edu/software/available/sas/>.

Course Assignments

You will have 4 assignments dealing with specific topics in predictive analytics (details will be posted on Canvas). **Students can use either R or SAS for their assignments, but exemplary source codes will be provided only for R.** Assignments are due on the date/time specified in the course. Assignments turned in late will be assessed a grading penalty. Assignments submitted after the due date may not be accepted

but, if they are based on valid excuse, there will be a minimum of a 20% reduction for each day late.

Tentative topical assignments are as follows.

- i. Assignment 1: Data preprocessing and exploration
- ii. Assignment 2: Regression analysis
- iii. Assignment 3: Classification techniques
- iv. Assignment 4: (Artificial or Convolutional) Neural networks

Weekly Quick Quizzes

Every week, course materials will be followed by short questions on Canvas. They are designed to “quickly” test your understanding of the lecture material. Answer-check mechanisms are provided in these questions, and they will contribute towards your grade.

Group Project

You must join a group of NOT MORE THAN 4 to develop a project proposal and a final report on a topic approved by the instructor. The project topic must be related to one or more aspect(s) of topics discussed in the course, where you will be developing and/or examining the impact of predictive analytics methods and models in a business environment. This project will have two parts. The first part is a report where you propose and describe your final project topic, its importance and a proposed methodology. The second part is the actual project implementation and write up. Details on this group project will be provided as we go along in the course.

Final Exam

A timed online final exam is required for the course. The exam will test your knowledge of predictive analytics topics and the use of software.

Participation

Your class attendance and class participation is highly recommended for this course. There is no make-up for missed in-class assignments. Much of the content of course will be covered in class. Students with questions or wishing any kind of follow-up from class should speak with the instructor during class or during regular office hours. If you wish to meet with your instructor outside of regular office hours, you should email your instructor to make an appointment.

Grading Policy

Assignments	40%
Weekly Quick Quizzes	10%
Group Project	20%
Final Exam	20%
Participation	10%

TOTAL

100%

Letter Grades and Points

95-100 = A, 90-94 = A-, 86-89 = B+, 83-85 = B, 80-82 = B-, 76-79 = C+, 73-75 = C, 70-72 = C-, 69 and below = F

Tentative Class Schedule

The following schedule provides general guidelines and is subject to change. A detailed schedule prior to the beginning of each week will be posted on Canvas. It will include the week's readings, assignments, instructions, etc. It is the student's responsibility to stay on track with readings and assignments to be successful in the course.

Week	Date	Topic	Readings
1	Aug. 20	Introduction to Predictive Analytics	Chapter 1
2	Aug. 27	Fundamental Concepts and Principles of Analytics	Chapter 2
3	Sep. 3	R Basics Data Exploration and Summary	Chapter 3
4	Sep. 10	Data Structure and Preprocessing	Chapter 4
5	Sep. 17	Linear Regression	Chapter 6
6	Sep. 24	Logistic Regression	Chapter 10
7	Oct. 1	Classification and Regression Tree	Chapter 9
8	Oct. 8	Hands-On Practice with Examples	
9	Oct. 15	Fall Break	
10	Oct. 22	Association Rules and Collaborative Filtering	Chapter 14
11	Oct. 29	Cluster Analysis	Chapter 15
12	Nov. 5	(Advanced) Neural Network	Chapter 11
13	Nov. 12	(Advanced) Convolutional Neural Network	
14	Nov. 19	(Advanced) Text Analytics	Chapter 20

15	Nov. 26	Project Presentations	
		Final Exam	

* Advanced topics can be adjusted depending on the progress of the class.

Statement of Students' Rights and Responsibilities

As a student in my class, you have explicit rights and responsibilities. Your full understanding and acceptance of the following rights and responsibilities can lead to more effective learning and more productive use of our time together.

You have the right to expect:

1. Your professor to be prepared for each class, to start class promptly at the designated time and to end class at the designated time.
2. Your professor to teach all scheduled classes or arrange for a qualified substitute if it is necessary to miss class because of illness or University approved commitments.
3. Clear statements of course expectations, policies, testing and grading practices and student performance.
4. Your professor to hold a reasonable number of office hours to discuss assignments or to assist you with course matters.
5. Knowledgeable assistance from your professor regarding class assignments and course content.
6. Professional behaviors reflecting equitable treatment, ethical practices and respect for your rights.
7. Opportunities to challenge ideas and defend your beliefs in a professional manner.
8. To be challenged to grow both academically and professionally.
9. Information regarding career opportunities related to ISM programs.
10. Your professor to abide by University policies.
11. Fairness and clarity in evaluation of your performance.
12. Adequate opportunity to appeal any perceived violations of the above rights.

You have specific responsibilities to:

1. Plan your study and work schedule appropriately to allow sufficient time to do quality class work. I suggest you devote at least 6 to 8 hours per week to this class.
2. Arrive at each class on time and be prepared to discuss assigned readings and participate in discussions.
3. Complete assignments by due date and submit quality work.
4. Understand and follow course policies as explained in class and in the syllabus.
5. Commit yourself to grow both academically and professionally.
6. Work effectively and cooperatively as a team member on group projects if so assigned.
7. Practice ethical behaviors and display respect for rights of others.
8. Contact your instructor and discuss circumstances which may prevent acceptable performance and to make such contact on a timely basis.

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9. Fully understand and abide by the UNCG Academic Integrity Policy and other University policies relating to student conduct.
 10. Report observed violations of the UNCG Academic Integrity Policy.

See the Student Section of the Bryan School website for additional information about “Faculty and Student Guidelines,”

<https://bryan.uncg.edu/wp-content/uploads/2017/08/Faculty-and-Student-Guidelines-2018-2019.pdf>

Academic Integrity, Ethical Issues and the Honor Code Policies

Students are responsible for becoming familiar with the Academic Integrity Policy in all its aspects and for indicating their knowledge and acceptance of the Policy by signing the Academic Integrity pledge on all major work submitted for the course. All individual assignments must be done by only you. Individuals should not work on assignments together. A single failure to follow this policy will result in a grade of 0 on that assignment; subsequent violations of this policy will result in a grade of F for the course. University students are expected to conduct themselves in accordance with the highest standards of academic honesty. I will pursue cheating as far as the university allows me. Specific information on the Academic Integrity Policy may be found on the UNCG web site at <http://academicintegrity.uncg.edu>.
