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**BUS 443H Business Analytics (Honors) Syllabus**

**COURSE DESCRIPTION:** This is an introductory course in Business Analytics (BA). It focuses on the theoretical and practical aspects of how businesses model existing data to predict the probability of future events and the values of key performance indicators. It uses the methods and tools of science to drive business decision making. Students will learn prescriptive, predictive, and descriptive techniques and tools. Topics will include statistical and mathematical modeling, data visualization, optimization, risk simulation, data mining, and decision analysis.

This course is one of the classes included in the pilot Analytics joint certificate program with SAS. The others are: BUS 340H (Information Systems Management), BUS 350H (Business Statistics), BUS 44x, and BUS 44x Practicum.

**CLASS TIME AND LOCATION:** Tuesday and Thursday: 3:00 - 4:15 pm Nelson B410

**LECTURER:** Sherry L. Fowler, MSCIS, BSBA Email: [slfowler@ncsu.edu](mailto:slfowler@ncsu.edu) (E-mail is the best way to contact me.)

**LECTURER OFFICE / OFFICE HOURS:** Nelson 1155 / Tuesday and Thursday 1:30 – 2:45 pm or by appointment

**GRADUATE ASSISTANT (GA):** Anindo Chatterjee[achatte4@ncsu.edu](mailto:achatte4@ncsu.edu) Contact the GA with questions first. If he can’t address it, he will forward it to me. Please put “BUS 443H” in the subject line of emails sent to us.

**GA LAB HOURS:** Monday/Wednesday/Thursday from 1:00 – 3:00 p.m. in the Nelson Walk-In Lab (across from room B410).

**PREREQUISITES:** ACC 340, BUS 340, orBUS 340H. Other: BUS 350 or 350H (Recommended)

**COURSE WEBSITE:** <http://moodle.wolfware.ncsu.edu> Please be sure to check the class website often. You will find class announcements, syllabus and schedule, homework information, PowerPoint lecture slides, and other useful things at this URL.

**COURSE REQUIREMENTS:**

* **REQUIRED TEXT:** Rental, e-book, or new copy of *Essentials of Business Analytics*, by Jeffrey D. Camm, et al., 1st edition. This text will introduce you to essential analytics concepts and techniques. We will use a variety of tools to solve problems in this course, including MS Excel, SAS products, and Frontline Solver’s Analytic Solver Platform (ASP).

**EXCEL AND ASP MATERIALS**: The text will use Excel and ASP tools. Additional tool how-to course hand-outs will be posted on Moodle.

The website for the text is [here](http://www.cengagebrain.com/cgi-wadsworth/course_products_wp.pl?fid=M20b&product_isbn_issn=9781285187273&token=). You will find the **Web Files** for chapter problems and answers to the even-numbered questions on the text website. When reading the book in preparation for class it is essential that you take an active approach. This means that you open the models that are being discussed in the book and work through them as you read. When a new method is presented, first repeat the example in the book and then try two or three new examples on your own. In class, I will assume you are familiar with the material in the reading. Finally, you should expect to return to the book after class or while reviewing, in order to refine and consolidate your knowledge.

* **SAS MATERIALS:** I will suggest several resources for you to use as how-to documents while learning the SAS tools. We may use several SAS tools throughout the course, including:
  + **SAS Visual Analytics** (Graphing and Exploration)
  + **SAS Visual Statistics** (Decision Trees)
  + **SAS JMP** (Regression Analysis)

* **REQUIRED HARDWARE AND SOFTWARE FOR THIS COURSE:**
  + Hardware: ***Students should have a personal laptop and bring the laptop to class. Some of the classes will require use of a personal laptop.***
  + Software:
    - Microsoft Excel: Students will be expected to use Microsoft Excel (***version 2010 or later, preferably version 2013***) on their laptops. MS Excel is available in the PCOM labs.
    - SAS (various products): This software will be available in the classroom and in the PCOM walk-in labs or via the cloud.
    - Frontline Solver’s Analytic Solver Platform for Education (ASPE): Students will be expected to use *ASPE in this course and must download the free trial version from the purchase of a “new” textbook, e-book, or rental onto their own laptop. Windows Virtualization software must be used on MAC computers.* ***NOTE: ASPE will not be available on the NCSU lab computers.***

**SUGGESTED READING:**

*Getting a Big Data Job for Dummies*, by Jason Williamson, 1st edition.

**COURSE OBJECTIVES:**

The course is designed to be useful for any business student, regardless of background or career plans. Methods will be applied to problems arising in a variety of functional areas of business, including economics, statistics, accounting, marketing, and operations. The skills developed here are vital to anyone helping organizations to navigate a course through uncertain and uncharted territory. More specifically, the student of this course will learn to:

* Understand and demonstrate how BI/Analytics software can be effectively used to improve decision making within a company.
* Use Excel spreadsheets effectively for business analysis and learn a comprehensive set of spreadsheet skills and tools, including how to effectively engineer, build, test, and use a spreadsheet.
* Demonstrate knowledge of the basic principles and formal techniques of applied mathematical (quantitative) modeling for managerial decision-making.
* Learn to use some of the more important analytic methods, recognize their assumptions and limitations, and employ them in decision-making.
* Practice translating descriptions of business situations into formal models and investigating and analyzing those models in an organized fashion.
* Understand settings in which models can be used effectively and apply modeling concepts in practical situations.
* Develop facility in generating insights via modeling in a variety of realistic situations by recognizing the key problem in a situation, developing a structure for analyzing the problem, carrying out a cogent analysis, and presenting the analysis and insights to interested parties in a convincing, non-technical manner.
* Develop data analytic and presentation skills through a series of practical exercises.
* Understand and demonstrate simulation-based decision support.
* Define a business problem that is appropriately addressed with a decision tool, identify the user's business needs, and define the system requirements for the decision tool.
* Demonstrate the ability to use both a data mining and simulation-based BI tool
* Demonstrate the ability to use a linear-programming-based (LP) tool that effectively addresses business needs.

**HONOR PRINCIPLE:**

Students are encouraged to exchange ideas and discuss concepts to foster a better understanding of the material. However, all work that is submitted by a student for a grade must be exclusively the original work of the student submitting the assignment, test, or project. Copying work is strictly forbidden! Each student is expected to work independently of other class members and other students on the modeling cases, except within assigned teams. Teams are specifically prohibited from working together. Students are encouraged to seek outside assistance for gathering *facts* relevant to the cases, but not to use assistance in the process of modeling and analysis. The instructor will be available to work with students on the modeling and analysis aspects of the cases. Students are *encouraged* to discuss their work with the instructor.

Students are expected to abide by NCSU's published "Code of Student Conduct" which can be viewed by clicking <http://studentconduct.ncsu.edu/policies-and-procedures>.

**GRADING:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  | | --- | --- | | Participation | 10% | | Submitted Assignments | 50% | | Midterm Exam/Project | 20% | | Final Team Project | 20% | | ***Total*** | ***100%*** | |  |

**COURSE POLICIES:** Students with a disability requiring special consideration must inform the instructor at the beginning of the semester. NCSU's policy conforms to section 504 of the Rehabilitation Act of 1973.

Attendance is expected for all classes and lab sessions. For additional details see the NCSU Attendance Regulations by clicking <http://policies.ncsu.edu/regulation/reg-02-20-03>.

No make-up exams will be given without prior consent of the lecturer. Authorization to miss an exam must be received at least 24 hours prior to the administration of the exam. All unauthorized absences from an exam will result in a grade of zero. No late homework assignments, late projects, or exams handed in late will be accepted and will receive a grade of zero.

**MOODLE GRADES:** Each grade for an exam or assignment is posted in Moodle before the assignment is returned. Each student is responsible for checking his/her grades in Moodle after a graded exam or assignment has been handed back. While great care is given to ensure grades are entered correctly, periodically mistakes can occur. You have up to one week to email with corrections after an assignment or grade is handed back. No grade changes will be made to assignments or exams after one week. Extra credit may be given at the sole discretion of the lecturer and should not be requested by the student.

Final grades will be determined according to this 100-point scale:

A+ 97-100%    B+ 87-89% C+ 77-79% D+ 67-69% F <60%

A 93-96%      B 83-86% C 73-76% D 63-66%

A- 90-92%      B- 80-82% C- 70-72% D- 60-62%

**ADDITIONAL COURSE INFORMATION:**

**If you have a question in this course, follow this process:**

1. Check our text, course hand-outs, or Moodle files.
2. Google it.
3. If it is a tool-based question, go to the vendor’s website (e.g., SAS or Frontline Solver’s ASP) and go through their online help documentation.
4. Email GA or lecturer.

**Need an introduction or refresher on basic statistics?** For a “general” free SAS e-course on Introduction to ANOVA, Regression, or Logistic Regression, click [here.](https://support.sas.com/edu/schedules.html?ctry=us&id=1979)

**THE ART OF MODELING**

"The purpose of modeling is *insight*, not *numbers*." - -Art Geoffrion

The **art of modeling** involves structuring and analyzing a business problem to arrive at compelling insights that help build organizational commitment to action. As in any problem-solving challenge, the analyst must balance the *usefulness* of the solution (for example, the power and credibility of the insights generated) with the *tractability* of the approach (that is, the analysis must be completed within time and resource constraints). This art is an increasingly vital skill for decision-makers to master. Leaders in both the private and public sectors must make decisions despite a high degree of uncertainty. Well-constructed models facilitate these decisions by capturing and clearly illustrating the impact of critical factors, and facilitating high-quality discussion focused on the most important risks and tradeoffs.

**Tentative Course Outline – BUS 443H *Business Analytics (Honors) – Fall 2015***

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| --- | --- | --- |
| ***Date*** | **Topic** | **Due: Active Readings / Practice Assignments / Graded Assignments (submit via Moodle)** |
| 8/20 | Introduction to the Course |  |
| 8/25 | Introduction to Business Analytics /  MS Excel Skills Review with Classwork Assignment | Read Chapter 1, Read Appendix A (if needed), and [this article.](https://mrsiderer.wordpress.com/2013/03/02/data-crunchers-now-the-cool-kids-on-campus/)  Watch first 16 minutes of: [this video](https://www.youtube.com/watch?v=oNNk9-tmsZY) |
| 8/27 | Spreadsheet Models, Spreadsheet Engineering, What-If Analysis with Data Tables and Goal Seek, SUM/SUMPRODUCT/ IF, COUNTIF, and VLOOKUP functions | Read Chapter 7 and complete problems 2, 4, 10, 12 |
| 9/1 | Descriptive Statistics, Distributions, and other Data Analysis Tools | Finish Intermediate Excel Exercises Assignment  Read Chapter 2 with Appendix |
| 9/3 | Descriptive Statistics, Distributions, Box Plots, Correlation, and other Data Analysis Tools | Complete all assigned Chapter 2 even problems and check answers in online Appendix C |
| 9/8 | Data Visualization – Pivot Tables, Quick Analysis, PowerPivot, and Charting with Excel | Submit Chapter 2 Case |
| 9/10 | Using Excel 2013 Self-Service BI: Dashboards | Read Chapter 3  Watch this video: [What's New in Excel 2013](https://www.youtube.com/watch?v=P0-8u0YKKfw) |
| 9/15 | Data Visualization with SAS VA Crosstab, charts, and SAS BI Dashboards | Complete all assigned Chapter 3 even problems  Watch this video: [SAS Visual Analytics](https://www.youtube.com/watch?v=1DUM4YdnzzA) |
| 9/17 | Data Visualization and Scenario Analysis with SAS Visual Analytics | Submit SAS Data Visualization Assignment |
| 9/22 | Linear Regression (Simple, Multiple, Least Squares Method, Model Fitting) using Excel | Read Chapter 4 and XLMiner for Regression Appendix  Submit Dashboard Assignment |
| 9/24 | Correlation, Linear Regression and Logistic Regression with SAS VA, VS, and JMP | Complete the Visual Statistics demo using these [how-to instructions.](http://www.sas.com/resources/asset/Quickstart-Guide-for-Vis-Stat-6.4.pdf)  Complete Chapter 4 problems: 2,4,6,and 8 |
| 9/29 | Time Series Analysis and Forecasting (Patterns, Moving Average, Exponential Smoothing, Seasonality) | Read Chapter 5 with Appendix  Submit Chapter 4 Case |

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| --- | --- | --- | --- |
| 10/1 | | Review for Midterm Exam  Guest Presentations by Brooksource and Duke Energy | Complete all assigned Chapter 5 even problems;  SAS Visual Statistics How-To PDF: Open and complete the Forecasting and Goal Seeking exercises found [here.](http://www.sas.com/resources/asset/Quickstart-Guide-for-Vis-Stat-6.4.pdf) |
| 10/6 | | Midterm Exam |  |
| 10/8-10/9 | FALL BREAK | |  | |
| 10/13 | | Data Mining – Data Sampling and Prep, Unsupervised Learning w/ Cluster Analysis (Visual Statistics) and Association Rules | Submit Chapter 5 Case  Read Chapter 6 |
| 10/15 | | Data Mining – Supervised Learning Partitioning, Classification, Prediction, k-Nearest Neighbors, Regression, and basic Text Mining | Complete all assigned Chapter 6 even problems |
| 10/20 | | Open Lab | Submit Data Mining Case |
| 10/22 | | Linear Optimization Models |  |
| 10/27 | | Linear Optimization Models | Read Chapter 8 with Appendix |
| 10/29 | | Integer Linear Optimization Models | Complete all assigned Chapter 8 even problems  Read Chapter 9 with Appendix |
| 11/3 | | Nonlinear Optimization Models | Complete all assigned Chapter 9 even problems  Read Chapter 10 |
| 11/5 | | Nonlinear Optimization Models | Submit Chapter 8 Case |
| 11/10 | | Decision Trees using SAS VA and VS Tornado Charts using JMP  Assign Final Team-based project | Complete all assigned Chapter 10 even problems  Read Chapter 11 |
| 11/12 | | Monte Carlo Risk Simulation | Complete all assigned Chapter 11 even problems  For ASPE Monte Carlo Risk video: see [Monte Carlo Risk Simulation Video](https://www.youtube.com/watch?v=eZ07Og40dPY) |
| 11/17 | | Monte Carlo Risk Simulation | Read Chapter 12  Submit Chapter 11 Case |
| 11/19 | | Team Project Presentations |  |
| 11/24 | | Team Project Presentations | **Final Project – Submit by 11:30 pm** |
| 11/25-27 | THANKSGIVING BREAK | |  | |
| 12/1 | Planning a Career | | Participation credit for attending | |

**INSTALLING THE ANALYTIC SOLVER PLATFORM FOR EDUCATION (ASPE) SOFTWARE:**

Access to Analytic Solver Platform for Education is free with a purchased copy of a new textbook. Follow the instructions below to install the software.

**Preparation**

The program you will download is SolverSetup.exe (for 64-bit Excel versions, SolverSetup64.exe). This single program installs Analytic Solver Platform for Education (ASPE), Risk Solver Platform for Education (RSPE), and XLMiner for Education, our data mining software. ASPE includes all the features of RSPE and XLMiner.

1. ASPE, RSPE and XLMiner all run under Microsoft Excel for Windows. They do NOT run under any Excel version for Mac. If you have a Mac, visit and read [www.solver.com/using-frontline-solvers-macintosh](http://www.solver.com/using-frontline-solvers-macintosh). To use the software for this course, you’ll need to install Windows alongside Mac OSX, and install Excel or Office for Windows. This will also allow you to use other Windows software, as well as Mac software on your machine.

2. Check whether you have 32-bit or 64-bit Excel – this determines which software version you should download. You probably have 32-bit Excel. You have 64-bit ONLY if:

(i) in Excel 2010, you click File – Help, and you see 64-bit in the lower right, or

(ii) in Excel 2013, you click File – Account – About Excel, and you see 64-bit at the top of the dialog.

**Registration**

1. Close any Excel windows you have open. Point your browser to [www.solver.com/student](http://www.solver.com/student). (Do not attempt to register or download anywhere else on Solver.com – this will cause trouble later.)

2. Fill out the form on this page. Enter your email address (to ensure you receive your license activation code), a login password you can remember, your first and last name, and North Carolina State for your school.

3. Enter **CCFOEBA** for the Textbook Code and **BUS443F15** for the Course Code. These are special for our course – entering these will give you a 140-day license. (Leaving them blank will give you a 15-day license.)

4. Check the box to acknowledge that you accept the Frontline Systems license agreement. Note: Frontline receives no money from you, the textbook publisher, or the university; this free 140-day license is a courtesy that they offer to students.

5. Click the button Register to Download. If everything is OK, this will take you to the Download page.

**Download**

1. On the download pages, next to the large blue Download Now button, there are radio buttons for 32-bit and 64-bit versions of Excel 2010 and 2013. (Excel 2007 and earlier versions are always 32-bit.) 32-bit is the default, because most users have 32-bit Excel, even though they have 64-bit Windows. On the Download page, change 32-bit to 64-bit **ONLY** if you’ve confirmed that you have 64-bit Excel (see above). Click the blue Download Now button.

2. In some browsers you will see a dialog "Do you want to run or save this file?" Click Save to save the file, named either SolverSetup.exe or SolverSetup64.exe.

3. Now check your email, at the email address you entered above, for a message containing an installation password and a license activation code. Frontline sends this email twice, from different servers, to ensure that you receive it. If you don’t get it, visit [www.solver.com/installation-password-request](http://www.solver.com/installation-password-request) and login to request another email message.

**Installation**

1. Make sure that Excel is closed (not running), then run the program SolverSetup.exe (or SolverSetup64.exe). SolverSetup will prompt you to enter the password and activation code from the email message above – enter them exactly as shown in the email (you can copy and paste).

2. The SolverSetup program will prompt you to choose between Analytic Solver Platform, Risk Solver Platform and XLMiner. Choosing Analytic Solver Platform gives you all the features of Risk Solver Platform and XLMiner, so this is the best choice for this class.

3. When the SolverSetup program finishes, start Excel (the last Setup dialog prompts you to do this). You should see new tabs on the Ribbon for Analytic Solver Platform and XLMiner. Click the Analytic Solver Platform tab – you should see a “Welcome” dialog with various links. Use the Help dropdown menu to open Help text, the User Guide and Reference Guide, and load example workbooks.

If all has gone well, you’re ready for our class exercises. If you have problems, the best avenues to get help are to email [support@solver.com](mailto:support@solver.com) (this creates a support ticket in Frontline’s Help Desk) or start a Live Chat from any page on [www.solver.com](http://www.solver.com/), or from within Excel (Help – Support Live Chat).