MIS 443/546 - Business Analytics

Winter 2017 – Th eve class

Instructor:	Mark Isken	Class Time:	Th 6:30-9:20p
Web:	http://www.sba.oakland.edu/faculty/isken	Class Location:	327EH
Email:	isken@oakland.edu	Office Hours:	By appt, before/after class
Phone:	370-3296	Office:	317 Elliott Hall

Overview

Decision making problems faced by managers are often quite complex and it can be very difficult to figure out how to structure the problem, how to obtain, organize and analyze data, how to organize and choose among different alternatives and how to present the analysis and conclusions. The result? People often guess or make decisions with very little analysis. Not such a good idea…

The explosion in inexpensive computing power, availability of massive amounts of data, and proliferation of modeling and application development software tools has made it possible for us to create very powerful decision support tools to help people make better decisions. That's what this class is all about. We will blend techniques from the fields of statistics, management science, computer science and information systems to do **business analytics**.

Business analytics is a relatively new term for a set of techniques and tools that actually have been around for quite some time. Our primary tool will be Excel along with Excel VBA and specialized add-ins for analysis. Spreadsheets are one of the most widely used tools in the business world. They have evolved into a functionally rich platform for quantitative business modeling and decision support system development. This course will allow you to become a power user and developer of spreadsheet based decision support tools for commonly faced managerial decision making problems. You will learn how to conduct "what if?" type analyses, use advanced spreadsheet features such as pivot tables, statistical and financial analysis functions, internal database features, querying external data sources, graphical data display, scenario analysis, risk analysis, simulation, goal seeking and solving optimization problems. You will also learn how to create spreadsheet based decision support tools by using application development features such as Visual Basic for Applications and integrating Excel with other Microsoft Office products such as MS Access. This course will integrate the use of spreadsheets with applied management science topics such as Monte-Carlo simulation and optimization models.

If I were to summarize my objectives for what I'd like you to learn about in this course:

- Quantitative spreadsheet based modeling of business problems
- Power user Excel skills including Excel VBA
- End-user DSS development principles and techniques
- Models + data + IS/IT = Business analytics
- Communicating the process and results of business analytics studies
- Role of modeling and analytics in business today

This stuff is not easy. If you can hear yourself saying: "I hate math", "I hate programming", "I hate computers", **don't take this course**. If you like using computers and your brain to solve difficult, interesting, meaningful problems and aspire to Excel and analysis wizard status, please take this course. It will be a fun course. You will have to work very hard but I promise that you will learn many valuable things.

Required Textbooks

Please see **Textbook and Software** section near the top of our course Moodle page.

Optional Materials

If you really get into Excel VBA, I highly recommend picking up a copy of the book widely considered to the bible of Excel programming:

Microsoft Excel 2013 Power Programming with VBA by J. Walkenbach

He has a terrific web site called The Spreadsheet Page dedicated to spreadsheets which includes tons of tops and lots o' free code. Check out our Moodle site for many more sources of information regarding modeling, management science, spreadsheets, VBA, graduate programs, professional societies, etc.

Software

Please read the **Software Overview of MIS 546** page available from the course website in the **Textbook and Software** section. It describes the software we'll be using in more detail.

Grading

There are three components that are weighted as follows for grading purposes.

Homework assignments	60%
Class prep assignments and online quizzes	15%
Final project	25%

Homework Assignments

There will be approximately 5 Homework Assignments. These will be challenging problems requiring you to integrate concepts discussed in the class as well as in the readings. Most assignments will require individual work while others might be group work. I will explicitly state the policy for each homework assignment.

Class prep and online quizzes

It is important that you do the assigned reading **before each class**. I'll often assign a Class Prep Problem or two pertaining to the reading assignment. You are to do these individually and you will turn them in via Moodle before the posted due date. As long as you make a reasonable attempt to solve the problem, you will get the full points. I will not be grading these in detail (as I will with the Homework Assignments). There will usually be a short online quiz each week based on the readings and the other materials provided for each topic.

Final Project

The Final Project will allow you to explore and use some of the topics learned in class in greater depth. The form of the project can vary but should fall in one of the following general categories. I've listed a few examples and will share more examples of what students have done in the past in class.

1. Build a spreadsheet based decision support tool to address some class of business analytic problem incorporating some of the modeling and data analysis concepts from the class.

   Example 1.1: Build a tool to help a potential homebuyer with the myriad of decisions associated with purchasing a home.

   Example 1.2: Build a tool that automates the process of importing some sort of raw data (e.g. server logs, fantasy sports data from websites), preps it for analysis and creates reports or other data visualizations.

2. Conduct a model based analysis of a specific business problem.

   Example 2.1: Use Monte-Carlo simulation to evaluate the financial viability of a new business venture.

   Example 2.2: Develop an optimization model for scheduling staff at a small business.

3. Conduct a technical research project which explores a specific business analytic technology in greater depth.

   Example 3.1: Implement some sort of business analytic tool (e.g. dynamic animated bubble charts) or model (e.g. Monte-Carlo simulation model or optimization model) in Excel, Open Office Calc, and Google Docs and compare the ease and functionality of the different platforms with respect to business analytics.

   Example 3.2: Create a spreadsheet based tool for helping students understand how genetic algorithms work.

Excel must be the primary tool used though other software can be used in addition to Excel. Each group should have 1-4 members. Each group should develop an idea for a decision support tool or model based analysis or technical research project that supports decision making in some business setting of your choice. Feel free to use your own experiences as a student or professional or even as a customer as the basis for ideas. Both textbooks also have a number of cases that could easily serve as the basis for a project. I'll show some previous projects in class for ideas.

Many more details will be posted on the course Moodle site.

How will this course be taught?

Ah, this is the fun part. This will NOT be a traditional lecture based course but more of a "business analysis studio". It will be taught in a teaching lab (202 Elliott Hall) and will be very hands-on. We will analyze data, create models, build systems and present our total solutions. Each class session will be more of a workshop than a lecture. It will be very relaxed and informal. I will usually give a mini-presentation lasting anywhere from 30-90 minutes (this may or may not be at the beginning of the session). It will usually cover some technical topic but I may also describe some neat business analytics success story or talk about career or graduate school opportunities in this field. The rest of the time in class will be like you might imagine an art studio might be like. We will create stuff. Sometimes you will work through a tutorial, other times you will work on homework problems or the class project. We will also play some games and explore things that only us techasauruses like to explore. You'll work alone and you'll work in groups. We'll all talk, present stuff, and critique each other's work. Since this course will be very hands-on, you need to bring both textbooks to class. We'll often work through various examples and problems and you'll need the VBA book as a reference as well when we start programming.

I will wear many hats. I will be a teacher in the traditional sense of explaining various technical topics and acting as the expert consultant, but I will spend more time coaching and encouraging you to learn what it is you need and want to learn. This may be a very different experience for you but one that I think you will find rewarding. To learn, really learn, this type of material, you must do more than listen to someone chat about it. You must do it. You must fight with difficult problems, bang your head against the wall a bit, learn from your classmates, wrestle with ambiguity, try things, make mistakes, ... OK, you get the picture. I will do everything I can to help you learn what you want to learn. It's your education, your money, and your time; make the most of it. You'll find that I'm very accessible, very helpful and I work really hard at trying to create interesting, valuable classes. You must be willing to accept the fact that there will be some ambiguity, some things will work better than others (or not at all), i.e. #$%will happen. That's OK, that's life.

What kind of background do I need?

Excel

A working familiarity with Microsoft Excel is relatively important. We'll do an Excel tutorial the first week that concentrates on techniques for working efficiently with spreadsheets but assumes a basic working knowledge of Excel. We will learn many advanced Excel techniques in the class and both textbooks also include many advanced Excel tips and techniques. They are both excellent texts.

Quantitative methods

You should have had at least one quantitative methods course which covered basic probability and statistics. However, I will be covering key topics from business statistics from an applied business analytics perspective. While we will use spreadsheets, this is a quantitative course. However, other than the above mentioned statistics prerequisite, you don't need any mathematical background beyond that (though certainly it will help). You do need to have an interest in learning how quantitative models can be used to attack difficult, important, business problems.

Computer programming

We will program in Visual Basic for Application (VBA) in this course. However, while a previous programming course (in any procedural language such as Python, PHP, Java Script, Visual Basic, C, C++, Pascal, Fortran, etc.) will certainly help, it is **not** a requirement. The VBA book we use assumes **no** previous programming experience. It does assume a desire to learn to program and a willingness to persevere when things get tough (and they will). As long as you're willing to work hard, you can learn to use VBA for Excel. It's a really valuable skill that can easily be leveraged to learn to program the other Office products such as Access and Word. You can do some amazing things with VBA.

Schedule of Topics

See course website for detailed schedule and readings. Here is a general topic outline for the course. I may switch around some topics depending on how things are going. There will be a few additional advanced topics for which there will be online based instruction made available.

#	Topic
1	Intro to Business Analytics
2	Spreadsheet based modeling/engineering
3	Simple mathematical models
4 5	Data preparation, exploration, visualization
6	VBA - 1
7	VBA - 2
8 9	Intro to Optimization
10	Analytical application development w/Excel
11 12	Intro to Simulation and Risk Analysis
13 14	Intro to Data Mining
15	Final projects due