COURSE TITLE: Quantitative Methods Prep Course (2013)

COURSE INFORMATION

Division: Operations & Logistics

Instructor: Brian Graham

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Phone: 604.822.8435

Office hours:

Section number:

Course duration: August 12 – 14, 2013

Pre-requisites: none

Term/period:

Teaching Assistant:

Email:

Phone:

Office hours:

Class meeting times: 8:00am-4:30pm

Classroom location: TBA (check schedule)

COURSE DESCRIPTION

This 3–day course is primarily concerned with introducing graduate business students to the basic tools of quantitative modeling and methods, including the use of Excel. To emphasize and reinforce these skills, we will be using problems in finance, decision analysis, inventory, optimization and risk environments. With that said, this is primarily a "techniques" course, designed to prepare you for the quantitative components of these programs. It is not intended to be a stand-alone discipline specific course but rather provide students with the quantitative tools necessary to understand and provide structure around fundamental business concepts. We will also ensure that there is considerable discussion devoted to conceptual issues in optimization using calculus, and also in finance where we will explore the time value of money, and learn how investors value streams of cash flows that arrive at different times. By the end of the course you will have the skills to translate business problems into a quantitative framework and have learned some of the tools needed to solve and analyze these problems.

LEARNING OBJECTIVES

At the end of this course, students should be able to:

Use analytical skills to create a more precise and structured understanding of a business problem.

Set up mathematical models which will describe, in quantitative terms, typical business problems.

Use appropriate algebraic and quantitative techniques to arrive at solutions to typical business problems (breakeven analysis, optimization, etc...).

Understand the benefits and limitations of quantitative models

Perform time value of money calculations.

Use single variable calculus to perform optimization calculations.

Solve one and two variable equations using different methods.

Use Excel to model and chart revenue, cost and profit problems.

Use the underlying foundation of probability to construct models and solutions in a risk environment.

ASSESSMENT

There will be no formal assessment or grade assigned in this course. However, throughout the 3 day course, students will be given "practice" assignments to be completed both inside and outside the classroom. These assignments are designed to provide useful and timely feedback and will be reviewed by the instructor. In addition to these assignments, there will be regular "optional" homework exercises which are designed to provide additional practice if needed.

COURSE RESOURCES AND MATERIALS

Reading Materials: *There is no required textbook but see below.*

Other Learning Resources: http://www.khanacademy.org . *This website provides free video instruction for many quantitative topics.*

Technology Requirements:
*A **Sharp EL738C Financial Calculator** is required on each day of this course, and will also be required for some of your courses during your program of study. This calculator can be purchased at the UBC Bookstore: http://bookstore.ubc.ca/customer-service/location-and-hours*

Activity Fees: *None*

Reading Materials:

If it has been some time since you have had to work with mathematics or you feel your mathematical preparation is limited, you might want to review some basic algebra or do some recreational reading of mathematics. Some suggestions include:

Recreational Reading – Not required

- Levitt, Steven and Dubner, Stephen, Freakonomics, Harper Perennial, 2005.
  or
- Gladwell, Malcolm, The Tipping Point: How Little Things Can Make a Big Difference, Little Brown & Company, 2000.
  or
- Paulos, John Allen, Innumeracy: Mathematical Illiteracy and its Consequences, Vintage Books, New York, 1990
  or
- Dewdney, A.K., 200% of Nothing, John Wiley and Sons, 1993.

Mathematical Review Reading – Not Required.

The books listed below are good examples of texts that provide an excellent review of fundamental quantitative skills. These books are intended to provide a review and are not required reading. They are for reference only. It is recommended that you **do NOT purchase** any of these unless you feel your quantitative skills are in serious need of improvement.

- Hummelbrunner and Coombs, Contemporary Business Mathematics with Canadian Applications with MyMathLab, 9th Edition, Pearson, Prentice Hall Publishing, 2012. (ISBN-10: 0132490269)

or

- Jerome, F.E., Business Mathematics in Canada, 6th edition, McGraw Hill, 2008. (ISBN-10 00709655285)

or

- Lial, Greenwell & Miller, Finite Mathematics & Calculus with Applications, 9th edition, Addison Wesley, 2011. (ISBN-10: 0321749081)

SCHEDULE

2013	CLASS TOPICS	ACTIVITIES / READINGS	WHAT'S DUE
Class 1 **August 12**	**Innumeracy** **Math models** **Decision analysis** **Algebra review** **Introduction to finance**	• Innumeracy – discussion of mathematical literacy • The quantitative approach to business. Why mathematics in business? • Mathematical models • Introduction to decision trees; choosing amongst alternatives • Algebra Review: Notation, variables, powers, quadratics, products, factoring, functions • Graphing functions. Spreadsheet graphing • Introduction to the Time Value of Money (TVM) • Factors to consider when pricing a bond • Simple and Compound Interest; formula approach • Discounting/compounding single cash flows. Present vs. future values. • Economic equivalence	
Class 2 **August 13**	**Finance continued** **Multiple cash flows** **Rate of Return** **Linear functions** **Solving equations** **Logarithms** **Application to equation solving: Breakeven analysis; price functions.** **Excel lab – Students can provide own laptop if desired, although a lab is available as well. Excel 2010 is the version we will use.**	• Multiple cash flows: Discounting/compounding • Moving cash flows without formulas • What does Present Value (PV) measure? • Realized Rate of Return (ROR); percentage growth • Problem Solving: What do we need to know? • Linear and polynomial equations. Why/how important? • Solving equations in one variable • Logarithms: What are they? Business use of logarithms. • Applying equation solving techniques to business problems	

Class 3 **August 14**	**Fitting a line to data** **Solving systems of equations** **Introduction to probability and random variables** **Finance re-visited: Annuities** **Introduction to single variable calculus** **Marginal analysis** **Calculus optimization** **Excel lab – Students can provide own laptop if desired, although a lab is available as well. Excel 2010 is the version we will use.**	• Fitting a line to data • Solving systems of equations • Introduction to probability, uncertainty and randomness • Probability trees and rules • Discrete vs. continuous random variables • Expected value of a discrete random variable • Introduction to annuities • Present value of an annuity • Annuity loan example • More examples of annuities • Economic value of annuity at different points in time • Introduction to calculus • What a business student needs to know about calculus • Limit concepts • Differentiation – an intuitive approach • Profit, Revenue and Cost models • Marginal profit, revenue and cost • Optimization – maxima and minima (Single variable calculus) • Application to profit/ revenue/cost optimization • Looking at the max/min problem with Excel	

Draft Schedule: Subject to change.

COURSE AND INSTITUTIONAL POLICIES

- Please bring a calculator to all classes.
- A laptop with Excel 2010 would be useful but is not required. The Excel component will focus on the PC version however, if you have a Mac laptop, it is recommended you bring it to familiarize yourself with the Mac functions.
- As this is a course designed to improve skills and techniques, the real benefit is from actually doing these things in real-time. Because of that objective, class notes will not be “posted”.
- After most classes, there will be some suggested homework exercises. These are optional. Participants will not be asked to hand in their answers to these exercises.