Date and Time: Spring 2016 Quarter, April 2nd – June 4th.
Saturday mornings, 10AM – 1PM at Main Campus
Please refer to MyBenU for classroom location

Instructor: Michael Modica, Ph.D. Mathematics
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Day of the Quants (DOQ) by Michael Modica (on D2L and free CD)

Prerequisite: None (although some experience in college math is helpful)

Purpose of Course: MSF 643 is a mathematical journey through topics in finance and the financial markets. It is designed to be informative, mentally stimulating and thought-provoking, and career enhancing.

Learning Method: To achieve the above purpose the following are included in the learning method.
1. PowerPoint Presentation of the material which is included on CD and D2L and is titled Ten Little Quants (TLQ).
2. Suggested reading (by the instructor) in the texts and supplementary material which is handed out, on CD, and on D2L.
3. A graded quiz each week in the beginning of the class period. Quizzes are open-book. Calculators and computers may be used. The solutions will be posted on D2L.
4. Suggested and recommended problems to be done at home and which can be submitted for extra credit to grade.
5. Problems done in class by the student. They are not graded but indicate participation (required).
6. Attendance is expected and required. Indeed students are encouraged to ask questions and make comments in class.
7. Films on the material are shown in class. Suggested films and material on the Internet are recommended.
8. Technology (Excel, Calculator, Internet sites) will be suggested. Having access to a computer and the internet is necessary. Having a calculator is necessary (either scientific and/or graphing).
9. The Final Exam is written during the 10th week in class. It is cumulative and open-book. A Practice Final Exam with solutions is handed out and posted on D2L the week before the Final Exam. Final Exams are not handed back to the student nor are the solutions posted. The Final Exam represents closure for the course.
10. The Code of Conduct and Honesty will be enforced. Students should treat other students and faculty and staff with courtesy and respect. Students may not copy other student’s work or past graded work from students or instructor. Your work must be your own. Normal collegial interaction amongst students is permitted.

Grade: The student will be assigned a letter grade by the instructor from among: A, B, C, D, F. The grade is based on a weighted average of their Quizzes (50%) and Final Exam (50%). The weighted average will be adjusted for Extra Credit or violations of the Code of Conduct or Honesty.

The grades are determined by absolute standards (that is not “curve graded”). The following are tentative grade standards: A: at least 90%; B: at least 70%; C: at least 50%; D: at least 30%; F: under 30%.

Each student will be sent an email with their grade, Final Exam score, and weighted average. The class as a whole will be sent an email with grade statistics.
Tentative Schedule of Material

The material naturally partitions itself into three parts:

1. Pre-calculus and Finance and the Financial Markets (weeks 1 - 4)
   This material is found in DOQ Sections 1-39 and TLQ Lessons 1-4

2. Calculus and Finance and the Financial Markets (weeks 5 – 7)
   This material is found in DOQ Sections 40-65 and TLQ Lessons 5-7

3. Probability and Finance and the Financial Markets (weeks 7-9)
   This material is found in DOQ Sections 66-82 and TLQ Lessons 8-10

**Weeks 1 – 3** The topics include linear representation of data, simple interest and discount, option P&L diagrams, least squares analysis and correlation and CAPM. Also included are functions, quadratic functions and equations, exponents and logarithms, compound interest, present value interpolation, force of interest, forward pricing, annuities, forward pricing, mortgages, and interest rate parity for currencies. What is An Option? And Algebra of Options are required reading (DOQ). Films on Options and Futures contracts will be shown.

**Weeks 4** The topics include bond pricing, yield to maturity, the Makeham Formula, The Salesman’s Rule, Zero Coupon Bonds, premium and discount bonds, accrued interest, the yield curve, terminal wealth, and Macaulay Duration

**Weeks 5-7** Calculus is discussed. The rules for derivatives and anti-derivatives, the Fundamental Theorem of Calculus, Taylor’s Theorem, Newton’s Method for solving equations, and functions of several variables and partial derivatives are discussed. Also discussed are areas of regions, the average value of a function, Trapezoidal Rule, optimization, and LaGrange Multipliers. Applications include duration and convexity of bonds. Also discussed is the calculus of options including equivalent share position, delta neutral positions, and gamma, theta, rho, and vega of options, and option position dissection. A film on option strategies will be shown. A film on upstairs trading will be shown.

Appendices include LaGrange Multipliers and Option Greeks for the advanced student (Black - Scholes Equation).

**Weeks 7-9** Probability and Statistics are discussed. Topics include the mean, median, mode, geometric mean, range, variance, and standard deviation.

Normal distributions and The Standard Normal Tables are discussed. Sample spaces and various rules for calculating probability are covered. Random variables, expected value, variance and covariance, and binomial distributions are covered. Inference and the Central Limit Theorem are included. Applications include volatility, option valuation using Scholes and Binomial Tree, portfolio variance, and investor sentiment and polling. Appendices include Discrete Random Variables and Option Valuation for the advanced student. A film on “The Midas Formula” will be shown.

**Week 10** Final Exam