EMSE 388. 10
Quantitative Methods in Cost Engineering

Instructor Information:
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Office Hours: Thursday 1:00PM to 3:00PM

Course Description:
Until recently, it was difficult for anyone except with a PhD who has some computer programming expertise to solve complicated finance problems. Today the power of EXCEL and add-ins such as @RISK, SOLVER, TOPRANK and PRECISION TREE makes it possible to tackle problems that were viewed only a few years ago as the province of “rocket scientists”. A variety of financial models will be considered as EXCEL case studies, e.g. fitting exponential growth of Microsoft sales, multi-period capital budgeting using the Analytical Hierarchy Process and Solver. These case studies will be used to highlight some of the theoretical complexities in solving these problems.

Recommended Prerequisite:
EMSE 269 Elements of Problem Solving and Decision Making or EMSE 260 Survey of Finance and Engineering Economics

Course Objectives:
Each student should: (1) learn how to use the software EXCEL to solve complicated financial problems (2), learn the theoretical underpinnings of these financial models to be able to draw meaningful conclusions, (3) learn what areas to look into if further understanding is needed. A variety of theoretical problems will be introduced in a financial context, such as non-linear optimization, regression analysis, analytical hierarch progress, and uncertainty analysis.

Method of Instruction:
During the class the material will be presented using ADOBE ACROBAT and EXCEL spreadsheets. Students are expected to print a copy of the slides a head of time and read them at least once. This should reduce the need for taking notes during class and stimulate student – instructor interactions.

Homework: Homework is considered to be a vital part of the course. Homework assignment will be given in the lecture notes. For each homework problem a student will be called upon to discuss their solution, so you must be prepared! The rest of the class should be involved in the discussion. Homework should be handed in the following week before class starts. Your level of effort will be graded. Not handing in the homework problem will result in 0 points. An inadequate level of effort...
will be awarded 1 point, and an adequate level of effort 2 points. A perfect solution of the Homework Exercise will result in 3 points. Hence, not having the correct answer may still result in 2 points, the aim is to learn at this stage. You should each bring electronic files of your homework to class in case you are called upon to show your work to the rest of the class.

Reading Assignments: Lecture Notes for the next class

Method of Evaluation:
Three in-class Computer Quizzes will be assigned using the software Microsoft Excel. Students will hand in the Electronic Copy of their files, which will be graded.

FINAL GRADE CALCULATION:
25% Homework
25% QUIZ 1
25% QUIZ 2
25% QUIZ 3

Text and Software:
The course does not require a textbook and will be taught from lecture notes. Some of the case studies that are being discussed are revised originals versions from the recommended additional text below.

Software: Microsoft Excel which standard available in our computer labs

Recommended additional text (but not necessary):
“Financial Models using Simulation and Optimization” by Wayne Winston

Academic Integrity:

THE ACADEMIC INTEGRITY CODE WAS DEVELOPED BY THE STUDENTS AND THE FACULTY OF GW WORKING TOGETHER IN 1995. BY ATTENDING GW EACH STUDENT IS PART OF THIS TRADITION.

"THE RIGHT ANSWER COMES FROM YOU"

Cheating will not be tolerated, i.e. copying or looking on another student's paper during the midterm exam or the final exam, will not be tolerated. Also, no material from previous EMSE 388 classes may be used may be used. In the event of cheating action will taken in accordance with the Academic Integrity Code. A copy of the Academic Integrity Code may be picked up at:

ACADEMIC INTEGRITY OFFICE
THE GEORGE WASHINGTON UNIVERSITY
609 22nd STREET, N.W. BLDG. AJ
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Fax Number: 202-994-0245
E-mail: dorpjr@gwu.edu
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<table>
<thead>
<tr>
<th>Session</th>
<th>Date</th>
<th>Class Topic</th>
<th>Homework due next class</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/19/2005</td>
<td>Intro Sensitivity Analysis with Data Tables: NPV Calculations and Profit Optimization</td>
<td>1 - NPV Analysis, 2 - Concavity</td>
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<tr>
<td>2</td>
<td>1/26/2005</td>
<td>Intro Sensitivity Analysis with Data Tables: Storage Capacity Decision, NPV Comparison with random Interest Rates</td>
<td>No Homework</td>
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<tr>
<td>3</td>
<td>2/2/2005</td>
<td>REGRESSION - Estimating Linear Relationship between Stock Return and Market Return Fitting Exponential Growth</td>
<td>3 - Regression, 4 - Mean Residuals</td>
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<td>4</td>
<td>2/9/2005</td>
<td>REGRESSION - Using Multiple Regression to Forecast Auto Sales</td>
<td>5 - Example QUIZ</td>
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<td>5</td>
<td>2/16/2005</td>
<td>SOLVER - Determining Monthly Loan Payments</td>
<td>6 - Monthly Payment (Due 3/2/05)</td>
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<td>6</td>
<td>2/23/2005</td>
<td>QUIZ 1 - PRACTICAL EXERCISE FOR GRADE (Sessions 1,2,3,4)</td>
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<tr>
<td>7</td>
<td>3/2/2005</td>
<td>SOLVER - Funding a Pension Liability, Multiperiod Capital Budgeting, Portfolio Optimization with Solver</td>
<td>7 - Variance</td>
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<td>8</td>
<td>3/9/2005</td>
<td>SOLVER - Funding a Pension Liability, Multiperiod Capital Budgeting</td>
<td>None</td>
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<td>9</td>
<td>3/16/2005</td>
<td>SPRING BREAK</td>
<td>Will be Provided</td>
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<td>10</td>
<td>3/23/2005</td>
<td>SOLVER - Analytical Hierarchy Process (AHP), Using AHP to select a job, Using AHP and Solver for Project Selection</td>
<td>None</td>
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<tr>
<td>11</td>
<td>3/30/2005</td>
<td>QUIZ 2 - PRACTICAL EXERCISE FOR GRADE (Sessions 5, 6, 7)</td>
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<tr>
<td>12</td>
<td>4/6/2005</td>
<td>UNCERTAINTY - The nuts and bolts of @RISK 1</td>
<td>8 - Proof Theorem</td>
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<tr>
<td>13</td>
<td>4/13/2005</td>
<td>UNCERTAINTY - The nuts and bolts of @RISK 2</td>
<td>9 - Inv. Triangular</td>
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<td>14</td>
<td>4/20/2005</td>
<td>UNCERTAINTY - Project Network Risk Analysis 1</td>
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<td>15</td>
<td>4/27/2005</td>
<td>QUIZ 3 - PRACTICAL EXERCISE FOR GRADE (Sessions 11, 12, 23 and 14)</td>
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- Electronic copies of the lecture notes and the Extra Problem assignment can be downloaded from my Faculty web-page at: [http://www.seas.gwu.edu/~dorpjr/EMSE388/Intro.html](http://www.seas.gwu.edu/~dorpjr/EMSE388/Intro.html)
- Please send me an introductory e-mail with subject “EMSE 388 Spring 2005” so I can create an E-mail Class List. Electronic solutions off the homework will be distributed via this E-mail Class List.