

IS102 Computer as an Analysis Tool

COURSE OUTLINE

Objective

In this course, students acquire practical skills (bridging technology and real-world situations) in modeling and resolving business problems using personal computers. With computers becoming essential tools for executives in most organizations, knowing how to effectively use them to solve problems will be very helpful in other business courses and students' future professional career.

Outline

Basics of analytical modeling practice

- learn how to frame problems, and integrate other skills (statistics, mathematics, business processes, and quantitative methods) to model and address management concerns

Computer-literate lifestyle

- become comfortable with the personal computer, motivated to self-learn problem analysis computer tools and know where to get such information and system resources

Computer analysis tools and skills

- be exposed to a variety of software solutions (e.g. add-ins) and gain competency in using Excel as an analysis, model verification, simulation and management reporting tool.

Assessment

Class Participation	15 %
Mid-Term Test	25 %
Assignments (3 x 10%)	30 %
Team Project	30 %

Recommended Text

Gips, James 2003. *Mastering Excel: A Problem Solving Approach*, 2nd ed, Wiley.

Other References

Winston, Wayne. 2004. *Microsoft Excel: Data Analysis and Business Modeling*, Microsoft Press.

Powell, G. Stephen & Ken Baker 2004. *The Art of Modeling with Spreadsheets*, Wiley.

Walkenbach, John. 2004. *Excel VBA Programming for Dummies*, Wiley.

COURSE SCHEDULE

Wk	Topic	Events
1	Basic Modeling in Excel	
2	Basic Modeling in Excel(2)	Try: Assignment 0
3	Functional Relationship	Due: Assignment 1
4	Data Lookup & Linkup	
5	Monte-Carlo simulation	Due: Assignment 2
6	It's about Time	
7	Mid-Term Test / Decision-Support	Due: Assignment 3
8	Recess Break	
9	Project Proposal	Due: Proposal Report
10	Data Analysis	
11	Decision-making	Due: Assignment 4 (optional)
12	Project Presentation	Due: Project Presentation
13	Project Presentation	Due: Final Report
14	Study Week	No Finals!

Class Preparation

Bring your notebook personal computer to class, each and every time. The notebook PC is your primary analysis tool. To gain competence, keep practicing on it – in and out of class, and adding your personal touches to it. The course moves at a rapid pace. It is the student's personal responsibility to complete the required readings and try out the exercises before each class meeting. In class, the instructor may choose to focus only on selected material. Without preparation, the discussions would not be as meaningful to you and it will be hard for you to keep up with the learning.

To be a good participant, maintain good attendance, actively contribute your team's work and class learning, and help promote a positive class atmosphere. Do come to class with an inquisitive and inquiring mind.

Assignment Submission

All assignments due are to be handed-in (in class) strictly within 15 mins of start of class. Late work, will be severely penalized, can be submitted to the SIS general office if you are unable to get to the instructor directly. Students confirm the assignment due dates on SMUVista.

Assignments are to be submitted in hardcopy, i.e. printed A4 white paper, usually no more than one page per question. Do not forget to include your name and class section. The work should look professional. Excel worksheets must include documentation: formulas of important cells and basic user instructions. Unless otherwise specified, electronic submissions are not required. (If required, it should be as few files as possible and usually no more than one worksheet per question.)

Individual Work Policy

For assignments given as individual work, students are expected to produce solutions on your own. You should not consult or discuss about the assigned problems with others and definitely not refer to other's work. Violation of this policy will be deemed as cheating.

Mid-Term Test

This open-book test (1.5 hrs, 3 questions) covers a reasonably wide range of Excel modeling skills. The questions would pose business problems and students are to return numerical values or Excel formulas in spaces provided in the (hardcopy) question paper.

EXCEL SUMMARY

Students should periodically review this list and identify items they should know but still unclear. They can then review them with the class's teaching assistant or instructor. Be sure to check out Help/Contents in Excel and in the VB Editor – they contain more information than the text book and most advance Excel & Excel VBA/Macro reference books.

Elementary

Files

New, Open/Close, Save

Default directory and some file management, Properties

Save as, *.xls, *.xlt, *.xla, *.csv, *.htm; Tools/General File (password) protection

Rows, Columns and Sheets

Insert/Move/Hide Row/Column/Sheet, Change column width, Change row height

Rename Sheets (Tab name, color)

Cells and Ranges (Active Object)

Formulas (+-*/^, calculation order of $A1 + 2*B1/C1^2$), Editing formulas

Number formats (general, fixed, scientific (E), \$ and %), Date/Time formats

Font (size, type, color), Alignment, Border, Patterns, Protection (locked, hidden)

Buttons (bold, italic, underline, 0.00, \$ and %)

Strings and string arithmetic (“=A”&B6&”B”)

Commands

Cut/Copy/Paste, Copy/Paste, Absolute/Relative referencing (A1, \$A\$1, \$A1 and A\$1)

PasteSpecial (Formats, Values, Transpose, Operations)

Autofill (pull down one or more cells), Undo

Tools/Options (Gridlines, Row & Col Headers, Formulas, Page Break, Macro Security)

Drawing Toolbar (Draw, Group, Order, Rotate/Flip, Auto-shapes, Arrows, Shadow, 3-D)

Intermediate

Functions: Function wizard, Sum(), Count(), Average(), Max(), Min()

Functions: If(), SumIf(), CountIf(), SumProduct()

Goal-seek, Scenarios, Tools Formula Auditing

Charts

Chart Wizard, Types (Bar, Line, XY), Formats

Series (add, delete), Legends, Axis, Titles

Windows, Menus, Views and Toolbars

New (Multiple) windows, Freeze pane, Split

Customization (Toolbar, Views)

Print (Set/Clear Print Area, Print Preview, Header/Footer, Fit to Page)

Tools/Options/Calculation (Automatic, Manual, Iteration)

Advance

Data/Sort (range, keys) and sort buttons, Validation, DataTable, Form, Filter, Pivot Table

Functions: Lookup(), VLookup(), HLookup(), Match(), Index(), Indirect(), Choose()

Functions: NormDist(), NormSDist(), NormInv(), NormSInv(), Exp(), Ln()

Functions: Array Function, Frequency(), Rand()

Functions: DSum(), DCount(), DAverage(), DMax(), DMin()

Tools/Add-in (Analysis Toolpak, Solver)

Forms (Button, Group, Options, Check, Spinner, Sliders), Control Toolbox

Macros Sub and Functions (CellFormula, ShowFormula)

Protection (Worksheet, Workbook, File, VBA modules)

Visual Basic Editor (Alt. F11), VB Help, VB Object Library, Project Reference

CLASS PARTICIPATION

Concept

Students are in the better position to document and evaluate their own class participation performance, when there's no reason to doubt their intellectual honesty. Objective criteria can be listed to guide students as to what constitutes good participation. Using these criteria to self-evaluate, students' self-evaluations and peer evaluations provide good bases from which instructors can evaluate their participation. This open objective feedback mechanism has helped motivate students to contribute actively to self-learning and community sharing.

Criteria

Students are to award themselves marks (ranging 0 to 5 marks) for each class as follows:

0 mark

- Absent and did not attend a makeup class

1 mark

- Present in class, but did not participate

2 marks

- Answered Prof's question on ... but it was not considered adequate by him
- Helped a class-mate to solve ... issue with Excel or CAT in-class exercise

3 marks

- Responded adequately to 1 questions asked to you in class, or
- Made a relevant comment to a pertinent issue in class, or equivalent

4 marks

- Responded adequately to 2 questions asked to you in class, or
- Asked or answered voluntarily 1 question in class, or
- Made 2 relevant comments to a pertinent issue in class, or
- Demonstrated to partial effect a model construction to the class, or equivalent

5 marks

- Responded adequately to 3 questions asked to you in class, or
- Asked or answered voluntarily 2 question in class, or
- Made 3 or more relevant comments to a pertinent issue in class, or
- Demonstrated well a model construction to the class, or equivalent

The average mark for the 12 classes (wks 1 to 7, 9 to 13) is multiplied by 3 to give the raw class participation mark of the student.

Implementation

Within 24 hours after each class, students must record their participation comments (please be very specific) and marks on a given spreadsheet. The instructor will post his responses and revise the marks accordingly. The instructor can award negative (-3 to -1) marks if he deemed that the student had not be truthful in her submission. Students should review their class participation performance with their instructors at least once during the whole term to explore how they can do better. The mechanism for communicating the worksheet between the student and instructors will be announced in class.

PROJECT GUIDELINE

Assignment

You are to form a 3 or 4 people consulting team by week 4, to devise and construct for a real client an original problem model. This problem must be of sufficient depth with a structure that permits a suitable model to be built and whose solution requires analysis. The modeling and analysis must appropriately use techniques covered in class (with the Excel spreadsheet) and, where needed, other tools and add-ins.

As a team effort (equal marks to the members), all team members are expected to participate fully in the project. In case of difficulty, please try to solve your problem before approaching the instructor to mediate. Each team member when queried must be ready to individually explain any modeling aspect of their team's problem.

Deliverables

A proposal (≤2 pages, shorter preferred, hard copy, simple stapled & no jackets and softcopy) and presentation softcopy file are due in class on week 9. Please state your class section, project team number, and team members. The proposal typically gives a brief background and introduces the problem, elaborating the business environment and possible uncertainties. A "Black Box" model and an Influence diagram are drawn to depict the variables, and suggestions for data collection and analysis covered. The team should earlier on have met their instructor out of class to get in-principle approval and by this time be confident of completing the project. The simple (5-min) presentation required should focus on explaining the proposal and not showmanship. The order of the presentation will be determined by lots.

A final presentation (20-min) is required and its softcopy submitted in class on week 12. The order of the presentation will be determined by lots.

The final report (≤10 pages, shorter preferred, hardcopy, simple stapled & no jackets) and softcopies of all associated files on week 12. The report should be management-directed and typically covers

- Problem statement and study justification
- Performance measures and their evaluations
- Data collection and analysis
- Decisions and alternatives
- Model sketches
- Trade-offs, scenarios and sensitivity analyses
- Results (tabulation, charts) and implications
- Model limitations, lessons learnt and conclusions
- Meeting log, team member contribution, and external party contact details

Grading

Overall, the project is worth 30% of the total course grade, comprising

Proposal Report	5%
Final Presentation	10%
Final Report	15%

In grading the project reports, the following are looked at:

- problem originality, and modeling elegance & innovativeness
- ability to reveal problem structure and apply analysis
- appropriate use of techniques and tools
- clarity, completeness, and accuracy of the report
- good writing skills (see Williams' "Style" or Strunk's "[Elements of Style](#)" for example)

Past Projects

Refer to the instructor for examples of projects done in the past in this course. Over-used projects topics (like food outlets, retail shops, hospitality and tourism) should be avoided.

Suggested Topics

Your instructor may want to choose a theme for the whole class, usually by industry sectors. Project topics include:

- Analyze data to describe business environment or identify opportunities/concerns
- Evaluate a new business to start or study an industry's potential
- Perform a market, human resource, operations or supply chain planning
- Examine accounting or financial management of a firm
- Provide a decision-support or business analysis tool
- Study an aspect of running a small business or a club/society
- Study an aspect of personal management (planning, tracking or analysis)

References

Public Services

- New York City (www.nyc.gov, e.g. Dept of Tpt www.nyc.gov/html/dot/home.html)
- Check out websites of other large cities (e.g. London, Toronto, Los Angeles)

Franchise

- Duncan Williamson (www.duncanwil.co.uk/franchise.html and www.duncanwil.co.uk/ponzi.html)
- WhichFranchise (www.whichfranchise.com)
- FranInfo Directory (www.franinfo.co.uk)
- GreenThumb (<http://www.greenthumb.co.uk/index.asp>)
- Choice Advice (www.franinfo.co.uk/choosingafranchise.lasso)

Financial and Risk Modeling

- www.studyfinance.com and www.studyfinance.com/lessons/excel
- Proctor, K. Scott 2004. *Building Financial Models with Microsoft Excel: A Guide for Business Professionals*, Wiley.
- Benninga, Simon 2000. *Financial Modeling*, 2nd Edition, MIT Press. (HG173 Ben)
- Day, Alastair L. 2003. *Mastering Risk Modeling*, FT Prentice Hall.
- Day, Alastair L. 2002. *Mastering Financial Modeling*, FT Prentice Hall.
- Jackson, Mary 2001. *Advanced Modeling in Finance using Excel and VBA*, Wiley.

Marketing Modeling

- Lilien, Gary & A Rangaswam, 1998. *Marketing Engineering*, Addison-Wesley.
- cob.jmu.edu/flahertb/merlot/spreadsheets/spreadsheetsresources.html

Search Engines (look for Spreadsheet Samples, Excel, etc.)

- Google (www.google.com) and Yahoo (www.yahoo.com)
- Teoma (www.teoma.com) and AskJeeves (www.AskJeeves.com)
- Mooter (www.mooter.com)
- WindowsLive (www.live.com)
- Dipsie (www.dipsie.com) – not available; stealth mode

COURSE DESIGN GUIDE

Key Agenda

The primary focus is on using personal computers as platforms for soliciting, consolidating, and presenting information (data, assumptions and relationships) as a model for a variety of business settings; consequent use of this model to drive understanding and consensus towards generating possible actions; and finally, the selection of a final course of action and assurance of execution success.

In-class exercises would be used to present in real-time end-user problem modeling and solving opportunities using Excel worksheets as modeling “canvas”. Students would interactively develop skills and experience to deal with open-ended questions, unclear assumptions and incomplete information. Where appropriate, solutions obtained could be extended as “Decision Support Systems” and “Proof-of-Concepts”.

Analysis would involve different management situations and model structural types: many simple formulas, complex formulas (large number of inputs and difficult relationships), large data set, model visualization & simulation, deterministic, dynamic (time-varying) & stochastic (uncertain) inputs, or constraints on solution space

Is not

Management Science or Operations Research Course

- These courses tend to focus on specific selected “classical” problem settings and teach the application of well-established models to find optimal solution for them.

Excel Course

- This would focus on the Excel spreadsheet application software and teaches functional knowledge of its features.

Prerequisite

Rudimentary knowledge of Excel is assumed. Students with no prior experience of Excel should go through on-line learning material on the Microsoft website, do additional problems on their own, or consult the teaching assistant or instructor out of class.

Learning Outcomes

Upon completing this course, students would be:

- able to frame problems, and integrate other business analysis skills (statistics, mathematics, business processes, and quantitative methods) to model and address broad business problems
- comfortable with the personal computer, motivated to self-learn problem analysis computer tools and know where to get such information and system resources
- exposed to a variety of software solutions (e.g. add-ins) and gained competency in using Excel as an analysis, model verification, simulation and management reporting tool, for possible use in other SMU courses and future professional career

Design Reference

Powell, Stephen. “Teaching Modeling in Management Science”

(ite.pubs.informs.org/Vol1No2/Powell/Powell.pdf)

Grossman. “Causes of the Decline of the Business School Management Science Course” (ite.pubs.informs.org/Vol1No2/Grossman/Grossman.pdf)

With regard to the overall ISM curriculum, the learning outcomes can be tabulated as follows:

Learning Outcomes	Tasks to achieve Outcomes	Methods of Outcome Assessment
1. Integration of Business & Technology in a sector context a. Business IT Value linkage skills b. Cost & Risk analysis skill c. Technology application skills in a particular sector.	<ul style="list-style-type: none"> In-class hands-on experience to frame open-ended problems Integrated application of other business analysis skills to case studies and in-class exercises Observing, modeling and analysis of real-life situations for team project 	<ul style="list-style-type: none"> In-class critique of student solutions and class participation grading Case studies and other assignments grading Team Project (presentation and report) grading
2. IT architecture, design and development skills a. System Requirements specification skills b. Software and IT architecture analysis and design skills c. Implementation skills d. Technology application skills	<ul style="list-style-type: none"> Use of Excel as an object-oriented environment with dynamic-data exchange Use of Excel as a small scale data repository and its management 	<ul style="list-style-type: none"> In-class critique of student solutions and class participation grading Assignment grading Team Project grading
3. Project management skills a. Scope and Requirements management skills b. Risk management skills c. Project integration and time management skills d. Configuration management skills e. Quality management skills	<ul style="list-style-type: none"> Team Project 	<ul style="list-style-type: none"> Team Project grading
4. Learning-to-learn skills a. Search skills b. Skills for developing a methodology for learning	<ul style="list-style-type: none"> Students to prepare for classes by surfing the internet for resources and data Students to learn finer features of Excel commands on their own or e-learning platform Exposure to a variety of software tools and extra work exercises 	<ul style="list-style-type: none"> In-class critique of student solutions and class participation grading Case studies and other assignments grading Team Project (presentation and report) grading
5. Collaboration (or team) skills a. Skills to improve the effectiveness of group processes and work product	<ul style="list-style-type: none"> Team assignments Team Project 	<ul style="list-style-type: none"> In-class critique of student solutions and class participation grading Team assignments grading Team Project grading
6. Changes management skills for enterprise systems deployment a. Skills to diagnose business changes b. Skills to implement and sustain business changes	<ul style="list-style-type: none"> Designing Excel worksheets as decision-support tools and understanding their use by end-users Preparation of assignments as consultancy reports 	<ul style="list-style-type: none"> Evaluation of user-friendliness of solutions Evaluation of understanding of organizational concerns and issues
7. Skills for working across country, culture and border a. Cross-national awareness skills b. Business-across-countries facilitation skills	<ul style="list-style-type: none"> Team Project 	<ul style="list-style-type: none"> Team Project grading
8. Communication Skills a. Presentation Skills b. Writing skills	<ul style="list-style-type: none"> Team Project 	<ul style="list-style-type: none"> Team Project grading

Y: This sub-skill is covered partially by the course; YY: This sub-skill is a main focus for this course.

COURSE CONTENT

Scope

Model Framing & Problem-Solving (identify and resolve conflict)

- Identify data requirement & relationships (complex & financial functions, time series)
- Ask probing questions, listing and clarifying assumptions
- Identify key drivers and backward relationships (goal seek, sensitivity analysis)
- Iterative computation (DataTable, recursive computation)
- Check and assure model accuracy (formula auditing trace)

Data Storage, Presentation and Retrieval (small price list, customer list, sales report)

- Data types (real, integers, time, date, character & strings)
- Data analysis and visualization (function and statistical distribution fitting, chart, trend)
- Data management (simple inquiries and filtering – text and number data)
- Data lookup (Lookup / VLookup / HLookup, index, match)
- Data integrity assurance (validation, worksheet protection, data entry form)

Alternative Generation

- What-ifs (single input change)
- Scenarios (multiple input changes)

Alternative Comparison and Evaluation

- Tradeoff (DataTable & Chart)
- Sensitivity Analysis
- Ranking (Sort, Small, Large)
- Best outcome and Risk analysis (Solver)
- Decision Matrix (SumProduct)
- Pareto Optimality (Chart)

Prevention and Contingency Planning

- Monte-Carlo Simulation (Rand and DataTable)
- Trigger setting and Recourse Actions (Conditional formatting)
- Testing (macros, VBA, algorithms, pseudo-code)

Delivery Means

Role-modeling construction of models (from business cases and scenarios)

Coaching student in hands-on practices

Student self-study of reference material and practice on non-graded exercises

Directing students in surfing the internet for resources and information

Collective edit, review and critique of models and internet resources

Assessment Methods

Participation in class discussion (15%)

- Self-evaluation

Mid-term Test (25%)

- Open-book test (1.5 hrs, 3 questions)

Graded Homework exercises (3 Assignments x 10% = 30%)

- All individual work: 1) Excel basics, 2) simple Excel models, and 3) more difficult Excel models (statistical analysis, simulation, case study, or macro/VBA.)

Team project (30%)

- Details as in the Project Guideline

Class exercises

Basic Modeling in Excel

Financial Analysis	-- Corporate financial report analysis and extrapolation
AlexProcessing	-- Productivity projection and equipment acquisition
AchillesAndTheTortoise	-- Logical resolution of a famous philosophical puzzle
MultiplicationTable	-- Setting up a simple table using relative/absolute referencing
Financial Projection	-- Corporate financial report analysis and extrapolation
F1NightCityRace	-- Relationship mapping, assumption testing, pricing
VillageCoffee	-- Framing a problem and extending it

Functional Relationship

TimeValue	-- Time value of money
LoanCalculator	-- Loan amortization
FlexibleLoan	-- Adapting to real-world changes
CharityDonation	-- Iterative recursive computation of charity donation amount
BlackScholes	-- Complex functional relationships. Financial options

Data Lookup

CCH Kindergarten	-- Keeping expenses within budget
EchoOfficeSupplies	-- Customer loyalty program
MyInvestmentPortfolio	-- Tracking and monitoring alerts
SpinWheel	-- Spinning a wheel to pick names.
ListManagement	-- Managing a dynamically changing list
WeightManagement	-- Planning and adapting to changes over time
PerCapitaGDP	-- Extracting data from web-page, sort and find answers
DataImport	-- Automating data extracting from external sources
ImportTextData	-- Importing data in text files into a spreadsheet
FormsAndLinks	-- Various ways to create forms and link data

Monte-Carlo Simulation

MonteHall	-- Marketing expense budgeting
DataSim	-- Generation of random variates
JohnLimRetirement	-- Retirement planning
Resampling	-- Multivariate resampling with replacement
OptimalPortfolio	-- Allocation of funds to different asset types to minimize risk
CardGame	-- Drawing from cards
Luckydraw	-- Sampling with replacement

Time Processes and Macros

TimerClicker	-- Data collection tool
SantaClaus	-- Simple queues, time-based
SimplerGGc	-- Queue Analysis templates
XDBbank	-- Queue Inference engine
GoldenCrossClinic	-- Appointment Planning
ImportantDates	-- Popup calendar
Countdown	-- Counting down to a deadline
UsefulVBA	-- Sample codes and examples

Data Analysis

StatsLies	-- Interpreting graphs
StatsReview	-- Review of basic statistical concepts
ProbFunctions	-- Review of simple probability distribution functions
FreqDistr	-- Histogram and frequency distribution
DataFit	-- Fitting data to statistical distribution
YankeeFruits	-- Stock-out risk and service level

WonderCookies	-- Effect of risk pooling
GoodnessFit	-- Critical thresholds of goodness of fit
HotelApex	-- Estimating missing demand information
GrandGrocery	-- Pivoting data for better analysis

Decision Support and Decision-making

B.Tankee	-- Scheduling delivery vehicles. Project template
ABCServices	-- Contract status monitoring
VideoMart	-- New business evaluation (cash-flow, stock replenishment)
SandakanMills	-- Decision-matrix and Pareto-Optimality
Prisoners	-- Resolving disparity in information

Application Areas (covered in Class exercises)

Financial (time series, time value of money, impact of volatility, cash-flow)
 Marketing (price setting, loyalty program, contract follow-up alert)
 General Management (evaluation of alternatives, tradeoff analysis, scenario planning)
 Operations (queues, capacity planning, stock risk pooling)

Teaching Resources

Course Specific (details in Lesson Plan)
 Self-documentation and “help”
 Recommended text and other references
 Modeling and Simulation communities on the web
 Modeling tools and information resources on the web

Related SMU Courses

MGMT004 Analytical Skills
 MGMT005 Creative Thinking
 OPIM101 Quantitative Methods
 OPIM 201 Business Processes
 STATS101 Statistics A
 STATS101 Statistics B

Excel and Spreadsheet Reference

Spreadsheet

www.ceap.wcu.edu/Houghton/EDELCompEduc/Themes/spreadsheets/spreadsheets.html

dssresources.com/history/sshistory.html

j-walk.com/ss and www.j-walk.com/ss/history

www.openoffice.org OpenOffice (open source “MSOffice”; free version of StarOffice)

Tips, FAQs and Community

www.mvps.org/dmccritchie/excel/xlnews.htm Archive of solutions

www.exceltip.com Joseph Rubin’s Excel Tips

www.cpearson.com and www.mrexcel.com Excel Tips

www.contextures.com/tiptech.html Contextures’ Excel Tips

www.beyondtechnology.com Beyond Technology on Excel, VBA and more

www.decisionmodels.com MS Office consultancy practice

www.contextures.com/xlfaqIndex.html FAQs

www.faqs.org Internet FAQs and www.faqs.org/faqs/spreadsheets/faq

<ftp://rtfm.mit.edu/pub/usenet/comp.apps.spreadsheets/faq>

j-walk.com/ss/excel/links/index.htm Links to Excel sites
www.bygsoftware.com/links/sp_links.htm Excel & VBA
groups.google.com/advanced_group_search *excel" in newsgroup field for answers
support.microsoft.com/support/mvp MS MVP (most valuable professional) program
visit newsgroups, answers questions and be selected by Microsoft to be MVP

Tutorial

opim-sun.wharton.upenn.edu/~opim101/fall03/lectures/excel1/Excel1.ppt
www.ncsu.edu/felder-public/tutorials/excel1.html
www.ncsu.edu/felder-public/tutorials/excel2.html
jimypadgett1.tripod.com/Chapter_One.htm
www.informit.com/guides/content.asp?q=msoffice&seqNum=13
www.mathtools.net, esp www.mathtools.net/Excel/Statistics Statistics
www.cpearson.com, esp www.cpearson.com/excel/datetime.htm and
www.cpearson.com/excel/events.htm
www.duncanwil.co.uk/pdfs/charting.pdf Charts
www.duncanwil.co.uk/pdfs/charts.pdf Charts
www.usd.edu/trio/tut/excel

Downloads

www.add-ins.com, www.verismall.com, www.solutionmatrix.com/?source=adwords
www.duncanwil.co.uk/links.html, www.ozgrid.com
www.kellogg.nwu.edu/faculty/myerson/ftp/addins.htm
www.kellogg.nwu.edu/faculty/myerson/ftp/tools.pdf

Teaching Management Science and Finance with Spreadsheets

INFORMS Transactions in Education (ite.pubs.informs.org)
Editorial (ite.pubs.informs.org/Vol1No1/Erkut/Editorial.pdf)

Powell, Stephen. "Introduction to the Special issue: Teaching Management with Spreadsheets Workshop"

(ite.pubs.informs.org/Vol1No1/Others/Introduction.pdf)

Special Issue on Teaching MS with Spreadsheets

(ite.pubs.informs.org/info/searchITEDB.php)

Holden, Craig. "Spreadsheet Modeling in Finance and Investment Courses"

(www.spreadsheetmodeling.com/SM_Column.htm)

Spreadsheet Model Management

Spreadsheet Research, U of Hawaii (panko.cba.hawaii.edu/ssr)

Spreadsheet Productivity Interest Group (sprig.section.informs.org)