FIN 654 – Financial Analytics - Syllabus

Foote-Khan-Avrenli: January 2020

Contents

Premise

The premise of this course begins with the following chain of reasoning:

- Financial decisions occur in the context of markets
- Markets determine value
- Value can change abruptly, or not, due to changes in information among market participants
- The interaction of market volatility with financial decisions changes market value

Since all financial decisions occur in markets (both overt and latent), the market value of an asset (or liability) is its present value. However, market volatility depends on changes in forces (and information) that drive value. For most organizations revenue, cost, and assets drive value. Thus to the extent that information changes these drivers, so does it change value.

How can we analyze changes in market value? The *finance* in financial analytics boils down to answering four questions about value and volatility:

1. How do we measure the interactions of risk and return in multiple markets?
2. Given the interactions of risk and return in assets and liabilities, what is the combination of assets and liabilities that return the highest value for the risk?
3. Given this combination (a portfolio) what is amount of capital needed to support the portfolio?
4. Given risk tolerances and thresholds for loss, how much cash should be held on the balance sheet?

We will be taking great pains to define exactly what we mean by risk (think of standard deviation) and return (a rate of change of value).

Readings, R Access, Data, and Tutorials

Readings

The main resources for the course are two books:

1. James D. Long and Paul Teetor. 2019. *R Cookbook 2nd Edition.* O'Reilley: Sebastopol, CA. A version of this resource is accessible here with extensive R and RStudio installation instructions.
2. William G. Foote. 2020. *Financial Engineering Analytics: A Topical Manual Using R.* Manuscript is accessible here.

The weekly live sessions will expand on key aspects of each chapter in Foote and prepare the student for the weekly assignment. R scripts, `RMarkdown` source files, and data sets accompany each week.

The content and `R` implementation in Foote (2020) derive from several sources. Among the recommended sources are:

1. David Ruppert and David S. Matteson. 2014. *Statistics and Data Analysis for Financial Engineering, Second Edition*, Springer. The authors have a site with several R scripts from their book accessible here.
2. Richard Brealey, Stewart Myers, and Franklyn Allen, 2015. *Principles of Corporate Finance*, various editions, McGraw-Hill. Here is the publisher's site for this book..
3. Alexander McNeil, Rudiger Frey, and Paul Embrechts, 2015. *Quantitative Risk Management: concepts, Techniques, and Tools* Princeton, 2014. The authors have a tutorial site with R and powerpoint materials accessible here.
4. Trevor Hastie, Robert Tibshirani, and Jerome Friedman. 2009. *Elements of Statistical Learning: Data Mining, Inference, and Prediction, Second Edition*, Springer Science & Business Media, 2009. The authors have a tutorial site with a downloadable edition of this book, R and other materials accessible here.
5. Numerous articles on various financial modeling topics. There are several accessible, expository readings from the *Financial Analyst Journal* written by practitioners for example Mark Kritzman at Windham Capital Managemen LLC. You can find these readings here for download.

R Access

Access R in 3 possible ways:

1. Use Whitman webclient
2. Use iSchool Rlab
3. Click here to download a document with details about installing R and preparing your computer for R analytics, as well as Long and Teetor (2019, chapter 1)

Note: Chrome users may need to right-click and select `Save Link As` to download files.

Data

All of the data for the course asynchronous materials comes from R packages or from the zipped file you can download from this site.

1. Set up a working directory on your computer. Typically this is located in the user's documents directory. In this working directory you will save *.Rmd files.
2. Within the working directory, set up a data directory called `data`. This is a subdirectory of your working directory.
3. Download all of the data into the `/data` directory on your computer. You will be accessing this data, for the most part `CSV` (comma separated values) files using, as an example, the following code.

```
data_in <- read.csv("/data/metals.csv")
```

Be sure to set up your files in a directory, then set the working directory as the source file location. In that way your call to `/data/metals.csv` (for example) will connect. Otherwise you will get the following error:

```
Error in file(file, "rt") : cannot open the connection
In addition: Warning message:
In file(file, "rt") :
  cannot open file 'data/metals.csv': No such file or directory
```

The **fix** is to properly set your working directory. In Rstudio on the tool bar go to **Session > Set Working Directory > Source File Location**. If you have set up the `data/` folder with the data as a sub-direcctory of the directory which is your source file location, `read.csv()` will be able to connect to your data set.

Finance and statistics tutorials

Here are several short tutorials in financial analysis.

- Calculating returns
- Net present value
- Internal rate of return
- Exchange rates

- Expected Shortfall confidence interval estimation
- Private placement of capital: deal structure (IRR, PV, option pricing, strategy ROI)
- Equity valuation using the binomial option pricing model

Modern finance theory and practice benefits greatly from advances in statistics and operations research. Here is a statistics primer that we can use to refresh our understanding and use of basic concepts and models often deployed in finance. You can access the Statistical Thinking site here

Weekly Schedule

Week 1 - R Warmups

View asynchronous material for Week 1 – R Warmups for Finance

Supporting files are in

- RMD
- PDF

2. Bring specific issues to the Live Session for discussion and resolution
3. Note that **cookbook-r.com** no longer has a `package` page. Revised directions are included in the week 1 RMD file above.
4. Before the Live Session, be sure to have a working directory set up with a `data` subdirectory. Be sure to have downloaded and extracted the data for the course into the the `data` subdirectory.

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. In the `R` console type `install.packages(c("shiny", "learnr", "GGally"))`. We will use these packages and the following `Rmd` file in workbook sessions. The interactive workbook is deployed here. Copy these files into your working directory to render your local version of this session:

- Video introduction to workbook 1
- Workbook 1 learnr RMD file
- Housing price data CSV file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)
4. Break-out ##1: Review `summary()` assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Break-out ##2: Review `ggplot()` assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review the next week's asynchronous material. (10 minutes)

Week 2 – R Data Modeling

View asynchronous material for Week 2 – R Data Model

In this "learn R on the job" week you will

1. Build on plotting and computational aspects of R

- Making log differences (returns and growth rates)
- Using ggplot2 to make production grade graphics with layering techniques
- Fitting distributions to data using the `gamma` distribution

2. Learn to control data flow using `if` and functions
3. Build two financial functions.

- Net Present Value and Internal Rate of Return

Supporting files are in

- RMD
- PDF

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. The interactive workbook is deployed here. Copy these files into your working directory to render your local version of this session:

- Live Session 2 learnr RMD file
- Power and natural gas price data CSV file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)
4. Assignment ##1: Review pivot and lookup assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Assignment ##2: Review simulation function assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review the Heating Oil No. 2 and next week's asynchronous material. (10 minutes)

Project 1: Heating Oil No. 2 Analysis

Here is your first graded project for formal feedback. You can use this project to practice the many aspects of R we covered these past two weeks.

HO2 is the designation for NY Harbor No. 2 Heating Oil prices

- Here is a description of the contract at the NYMEX (CME Group)
- More information on HO2 is deposited here
- Fuel oil is used to hedge a variety of refined oil products including Jet-A (Kerosene) and propane.

View **Project 1: HO2 Analysis** here. The code for this project is in the following RMD file. Data can be found in the data zip file download from here.

- RMD
- CSV

Week 3 – Macro Financial Analysis Part 1

View asynchronous material for Week 3 – Macrofinancial Analysis Part 1

We build on many of the finance concepts we covered in weeks 1 and 2. Here we begin to build out the

- Stylized facts of the market including volatility clustering, leverage, and the persistence of returns and volatility
- Visualize risk and return

Supporting files are in

- RMD
- PDF
- This article introduced the notion of a statistical approach to the so-called *stylized facts* of markets.

Further practice (optional)

For the adventurous among you try out the code used in the macro-financial asynch using data from the Fama and French market returns data set.

- Fama and French stock market factors data set: fama-french-daily.csv
- The factors in each column are defined here
- You can read more about this influential model from Fama and French here

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. The interactive workbook is deployed here. Copy these files into your working directory to render your local version of this session:

- Live Session 3 learnr RMD file
- IYM data CSV file
- USO data CSV file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)
4. Break-out ##1: Review data inspection and exploration assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Break-out ##2: Review autocorrelation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review next week's asynchronous materials. (10 minutes)

Week 4 – Macro Financial Analysis Part 2

View asynchronous material for Week 4 - Macrofinancial Analysis Part 2

We build on many of the finance concepts we covered in week 3. Here we begin to

- Relate markets to one another
- Visualize risk and return and correlation impacts
- Attempt to forecast GNP!
- Try to make our own inferential statistics using bootstrapping techniques

Supporting files continue to be in the `week 3` materials (even though we are in Week 4!)

- RMD
- PDF

View a primer on quantile regression here.

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. The interactive workbook is deployed here. Copy this file into your working directory to render your local version of this session:

- Workbook Session 4 learnr RMD file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)

4. Assignment ##1: Review cross correlation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Assignment ##2: Review market spillover assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review next week's asynchronous materials. (10 minutes)

Project 2: Foreign Exchange Markets

Live Sessions 3 and 4 will cover material to help successfully complete Project 2.

View a tutorial on **foreign exchange markets** here.

View **Project 2: foreign exchange market analysis** here

- RMD

Week 5 – Market Risk Part 1

View Market Risk asynchronous material for Week 5 – Market Risk Part 1

Yes, we are in Week 5 by the calendar, and you will need to go to the Market Risk material that is located in Week 5.

- We will wander into various markets and repeat our macrofinancial data analysis.
- Building on this, we will begin to look at the tails of the returns distributions and define risk measures
- You can practice this, and next week's, modeling efforts using the exchange rates, HO2, and other data sets you have already become very familiar with.

Supporting files (`Week 4` materials)

- RMD
- PDF

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. The interactive workbook is deployed here. Copy this file into your working directory to render your local version of this session:

- Workbook Session 5 learnr RMD file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)
4. Assignment ##1: Review GARCH simulation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Assignment ##2: Review historical simulation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review next week's asynchronous materials. (10 minutes)

Week 6 – Market Risk Part 2

View Market Risk asynchronous material for Week 6 – Market Risk Part 2

This week we continue with

- Value at Risk (VaR) is a quantile and more importantly, the VaR of a combined portfolio can be larger than the sum of the VaRs of its components (sub-additivity). This makes VaR not very useful in developing estimates of capital needed to manage the risk of a business.
- Expected Shortfal (ES) is the loss in excess of a threshold. Thresholds are often the VaR quantile of loss in the tail of a loss distribution. The ESof a combined portfolio is indeed the sum of the ES of the components of portfolio. They are additive – a very useful metric property for estimating capital, especially NPV changes.
- Again, for practice, use these metrics on prior weeks' data sets.

Supporting files continue to be (`week 4` materials)

- RMD
- PDF

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. The interactive workbook is deployed here. Copy this file into your working directory to render your local version of this session:

- Workbook Session 6 learnr RMD file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)
4. Assignment ##1: Review expected shortfall estimation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Assignment ##2: Review loss tail estimation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review next week's asynchronous materials. (10 minutes)

Project 3: Metals Risk and Capital

Heavy metals

- Go to this site to get some rock hard information about nickel, copper, and aluminum (aka aluminium).
- The London Metals Exchange (LME) has a great introductory presentation on metals hedging here and more general hedging information here.

View these two versions of Project 3: Escapades in market risk analysis and a `flexdashboard` project example:

- This version closely follows the R notation used in the asynchronous portion of the course, with RMD file
- This version follows the development of the same analysis using tidyverse techniques from the synchronous workbook sessions with RMD file
- Here is an example of the use of `flexdashboard` for this project with RMD file.

Week 7 – Portfolio Analytics Part 1

View asynchronous material for Week 7 – Portfolio Analytics Part 1

This week we travel into the 2 asset case

- We define risk tolerance (remember our extreme value work) and a threshold for loss
- We then specify a statistical confidence interval to build upper and lower bounds on our choices
- Then we use some very interesting math to solve for the optimal allocation of cash and risky asset.

Supporting files are in

Supporting files (materials for use in this week 7)

- RMD
- PDF

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. The interactive workbook is deployed here. Copy this file into your working directory to render your local version of this session:

- Workbook Session 7 learnr RMD file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)
4. Assignment ##1: Review portfolio construcion assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Assignment ##2: Review risky asset-cash decision simulation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review next week's asynchronous materials. (10 minutes)

Week 8 – Portfolio Analytics Part 2

View asynchronous material for Week 8 – Portfolio Analytics Part 2

This week we continue into the multiple risky asset case

- Some matrix math helps us with describing and specifying portfolios
- We use a quadratic programming solver in R very similar to the capability of Frontline's Excel add-in solver.
- We then try to run the analysis full circle to use the optimal (tangency) risk asseet portfolio in the Week 7 model of cash and risky asset.
- The **risky asset** is really a portfolio that might be traded. In fact, this is what an ETF (exchange-traded fund) is.

Supporting files (`Week 8` materials) continue to be

- RMD
- PDF

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. The interactive workbook is deployed here. Copy this file into your working directory to render your local version of this session:

- Workbook Session 8 learnr RMD file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)
4. Assignment ##1: Review risky portfolio allocation together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Assignment ##2: Review risky asset-cash decision (again) simulation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review next week's asynchronous materials. (10 minutes)

Project 4: Metals Risk-Return Allocation

We continue the Ni-Cu-Al metals discussion with the computation and interpretation of the optimal allocation of these metals in a revenue portfolio.

- Be sure to note how we insert (slyly!) extreme value finance and confidence intervals through the use of a subsetting of the data by quantile (VaR) threshold and by sampling returns.
- The last question is of great import: what is the optimal allocation of optimal risk assets (Ni-Cu-Al) and cash (and high quality marketable securities)? The answer relies on the first part of the asynchronous material about the Iberian contract.

View Project 4: metals portfolio analysis here

- RMD

Week 9 – Enterprise Risk Analytics Part 1

View asynchronous material for Week 9 – Enterprise Risk Analytics Part 1

This is a capstone set of material that motivates us to simulate loss for a portfolio

- We use a monte carlo technique called a copula to jointly generate portfolio returns
- We also allow ourselves the luxury of using non-normal distributions, like our old friend the `gamma` distribution fron week 2.
- Applying this material to the metals data might prove very useful in understanding the level and the confidence intervals surrounding loss and capital.

Supporting files (`Week 9` materials) are

- RMD
- PDF
- R file for the Shiny app in the asynchronous material

Workbook session

1. Welcome: meet and greet, respond to polls, list asynch highs and lows in chat room. (5 minutes)
2. The interactive workbook is deployed here. Copy this file into your working directory to render your local version of this session:

- Workbook Session 9 learnr RMD file

3. Review and discuss asynch questions and issues. Record solutions on the wall. (15 minutes)
4. Assignment ##1: Review monte carlo simulation of correlated innovations together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Assignment ##2: Review margin simulation assignment together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session and review next week's asynchronous materials. (10 minutes)

Week 10 – Enterprise Risk Analytics Part 2

View asynchronous material for Week 10 – Enterprise Risk Analytics Part 2

This last week completes the preparation for the individual final project.

- You can use this example of a financial web application built with the tools learned in this course as a template
- To answer all of the questions in the final project, you might need to increment the features of the example application.

Workbook session

1. Welcome: meet and greet, respond to polls, list course highs and lows in chat room. (5 minutes)
2. The workbook is deployed here. Copy this file into your working directory to render your local version of this session:

- Workbook Session 10 flexdashboard RMD file

3. Review and discuss final project questions and issues. Record solutions on the wall. (15 minutes)
4. Assignment ##1: Review choices of business contexts, data, analytical approach together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
5. Assignment ##2: Review sample flexdashboard final project template together. Break out into separate rooms to discuss, analyze, and formulate report. Share report together. (30 minutes)
6. Debrief this session. (10 minutes)

Project 5 – FINAL

Project 5 – The Final Project

We have built everything from net present value and internal rate of return calculators to extreme market event indicators, optimal portfolios: all set against market risk and return stylized facts. The final project puts it all together for a business context and data set of your choice.

Assignment

This assignment will be the focus of Live Session 10. The final project is due at the Final Project Session in week 11. Submit into **Coursework > Assignments and Grading > Project 5 > Submission** an `RMD` file with filename **lastname-firstname_Final-Project.Rmd** and associated `csv` or other relevant files. The overall business questions are:

How can we analyze changes in market value? The *finance* in financial analytics boils down to answering four questions about value and volatility:

1. How do we measure the interactions of risk and return in multiple markets?
2. Given the interactions of risk and return in assets and liabilities, what is the combination of assets and liabilities that return the highest value for the risk?
3. Given this combination (a portfolio) what is amount of capital needed to support the portfolio?
4. Given risk tolerances and thresholds for loss, how much cash should be held on the balance sheet?

While these are the four generic financial analytic questions we posed and began to answer, the final project requires a specific context. Here are the features needed to complete the final project.

1. Choose a business decision and context. Based on that decision and context choose at least three (3) **daily** time series of sufficient length to help (often not completely) answer the key business questions that arise out of the business context and decision.
2. Build a flexdashboard application that addresses the business context you have chosen. The following outline is a guideline for the work flow in the web application. Populate the application with appropriate models, descriptive, explanatory, and predictive text, tables, and plots.

3. List in the text the `R` packages and skills needed to complete this project along with references used, including data sources.
4. Discuss how well did the results begin to answer the business questions posed for the project.

- View Project 5: FINAL here
- RMD file is here

Additional matters

Audience

This course is designed for graduate students interested in pursuing a career in financial services with an emphasis on business analytics. It is offered as an elective in the MS in Business Analytics Program, and can also be taken by graduate students from other programs in order to complete their course requirements.

Description

An introduction to methods and tools useful in decision-making in the financial industry, which may from time to time include: macroeconomic event studies, analysis of term structures, equity data analysis, style analysis, credit risk, extreme value analytics, trading analytics, volatility measurement, portfolio management, andn enterprise risk management.

Course credits

The successful completion of this course will earn the student 3 credit-hours.

Pre-requisites

While the catalog description and syllabus do not list pre-requisites, We strongly urge students to complete Data Analysis (MBC 638 or equivalent), Managerial Finance (MBC 633 or equivalent) and Business Analytics (SCM 651 or equivalent) before registering for Financial Analytics.

Additional Course Description

This course is designed to provide students with approaches to analyze various types of financial data sets, and to make meaningful decisions based on statistics obtained from the data. The course covers various areas in the financial industry, from analyzing transactional data (credit card receivables) to studying global relations between macroeconomic events to managing risk and return in multi-asset portfolios. Students will be exposed to a wide range of techniques including non-linear estimation, portfolio analytics, risk measurement, extreme value analysis, forecasting and predictive techniques, and financial modeling. Students will be expected to complete several assignments projects in various areas, applying methods learned in the course to problems faced by decision makers. These projects will involve working in teams of two to complete each assignment. A final project will apply techniques to the construction of an online application.

Grading

Grades for work performed in this course are distributed as follows.

1. Four (4) team projects, equally weighted, constitute 50% of the final grade.
2. Personal participation in the course, measured by completing at least 6 asynchronous modules and attending at least 8 live sessions contributes to 10% of the final grade.
3. One (1) personal project constitutes 40% of the final grade.

Students, in teams of two to four, will both be given the same score for a completed project. A final, individually executed and submitted project is due at the end of the term during final exam time.

Grades for all assignments will follow this general rubric:

- **Words:** The text is laid out cleanly, with clear divisions and transitions between sections and subsections. The writing itself is well-organized, free of grammatical and other mechanical errors, divided into complete sentences, logically grouped into paragraphs and sections, and easy to follow from the presumed level of knowledge.
- **Numbers:** All numerical results or summaries are reported to suitable precision, and with appropriate measures of uncertainty attached when applicable.
- **Pictures:** All figures and tables shown are relevant to the argument for ultimate conclusions. Figures and tables are easy to read, with informative captions, titles, axis labels and legends, and are placed near the relevant pieces of text.
- **Code:** The code is formatted and organized so that it is easy for others to read and understand. It is indented, commented, and uses meaningful names. It only includes computations which are actually needed to answer the analytical questions, and avoids redundancy. Code borrowed from the notes, from books, or from resources found online is explicitly acknowledged and sourced in the comments. Functions or procedures not directly taken from the notes have accompanying tests which check whether the code does what it is supposed to. All code runs, and the `R Markdown` file `knits` to `pdf_document` output, or other output agreed with the instructor.
- **Modeling:** Model specifications are described clearly and in appropriate detail. There are clear explanations of how estimating the model helps to answer the analytical questions, and rationales for all modeling choices. If multiple models are compared, they are all clearly described, along with the rationale for considering multiple models, and the reasons for selecting one model over another, or for using multiple models simultaneously.
- **Inference:** The actual estimation and simulation of model parameters or estimated functions is technically correct. All calculations based on estimates are clearly explained, and also technically correct. All estimates or derived quantities are accompanied with appropriate measures of uncertainty.
- **Conclusions:** The substantive, analytical questions are all answered as precisely as the data and the model allow. The chain of reasoning from estimation results about the model, or derived quantities, to substantive conclusions is both clear and convincing. Contingent answers (for example, "if X, then Y, but if A, then B, else C") are likewise described as warranted by the model and data. If uncertainties in the data and model mean the answers to some questions must be imprecise, this too is reflected in the conclusions.
- **Sources:** All sources used, whether in conversation, print, online, or otherwise, are listed and acknowledged where they used in code, words, pictures, and any other components of the analysis.

Assignment Formatting

All assignments must be turned in electronically, through the learning management system, by each student. All assignments will involve writing a combination of code and actual prose. You must submit your assignment in a format which allows for the combination of the two, and the automatic execution of all your code. The easiest way to do this is to use `R Markdown`. `R Markdown` also allows the use of interactive modeling through `Shiny` applications.

Work submitted as Word files, unformatted plain text, etc., are not acceptable at any time during the course. Each assignment will require the submission of at least one `R Markdown` script file and the `pdf` or `html` file that the `R Markdown` script generates. When using data sets, this course will only use `csv` (comma separated variable files generated by Excel or in text files. If the submission uses a `csv` file, that file must also be submitted with the `R Markdown` script and generated `pdf` or `html` output files. The student may also submit a supplemental `R` script file, suitably commented, that represents the `R` code chunks in the `R Markdown` script.

Managing the data base of submitted assignments throughout the course will be aided by standards including file name construction for assignment submission. To this end, every file submitted must have a file name which includes the student's name, course identifier, and clearly indicates the type of assignment (project) and its number (week). Here is the format we will use: `yourName_courseidentifier_Assignment#.ext`, where # is the week number and ext is the file name extension. For example W.G. Foote would submit an `RMarkdown` file with this filename: `wgfoote_FIN654_Assignment1.Rmd`, where the file extension `Rmd` is the extension that `RStudio` uses for `R Markdown` documents. File extensions `R`, `PDF`, and `CSV` are the other three admissible file types.

Course Specific Policies

Students are expected to behave in a professional and courteous manner at all times when interacting with all members of the course learning community. Respect for others is demonstrated through attendance, meaningful participation, and punctuality. Every effort should be made to be present for the entirety of each session especially since weekly assignments will be made conditional on content in live sessions.

All projects must be completed and submitted by the due dates and times set out. This will allow the entire class to review and revise submissions in a timely fashion. Submissions to the 2SU learning management system are based on eastern time. Late submissions will result in student inability to accumulate the knowledge needed to advance to the next week's coverage of course topics. Late submission will also delay necessary instructor feedback to the student in a timely fashion. As the course continues to layer on more skills and capabilities, a late submission with inaccurate or incorrect implementations of financial applications will only deprecate the student's ability to successfully complete future assignments.

Academic Integrity

Syracuse University's Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the policy and know that it is their responsibility to learn about course-specific expectations, as well as about university policy. The university policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same written work in more than one class without receiving written authorization in advance from both instructors. The standard sanction for a first offense by a graduate student is suspension or expulsion. For more information and the complete policy, see http://academicintegrity.syr.edu/academic-integrity-policy/.

In this course, all sources, whether verbal, online, in print, or other, must be cited following prevailing business and academic requirements and practice.

Disability-Related Accommodations

If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), http://disabilityservices.syr.edu, located in Room 309 of 804 University Avenue, or call (315) 443-4498, TDD: (315) 443-1371 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented Disabilities Accommodation Authorization Letters, as appropriate. Since accommodation may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

Religious Observances Policy

Syracuse University religious observances policy, found at http://supolicies.syr.edu/emp_ben/religious_observance.htm, recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes for regular session classes and by the submission deadline for flexibly formatted classes. For fall and spring semesters, an online notification process is available through `MySlice > Student Services > Enrollment > My Religious Observances`.