BUSOBA 6222: DATA ANALYSIS IN FINANCE
FALL 2023

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WEB PAGE:	Carmen
CLASS TIME & ROOM:	Mon/Wed 10:15 am - 11:45 am, Gerlach Hall 305
OFFICE HOURS:	Monday: 2:30-3:15 & Tuesday 2:30 pm – 3:30 pm OR by appointment, please email with a subject "BUSFIN 6222"
TEXTBOOK:	DeFusco, R.; McLeavey D.; Pinto J.; Runkle D., "Quantitative Investment Analysis", 3rd Edition, WILEY ISBN-13: 978-1119104223 (Hardcopy)

Course Description

As advancements and changes in every field, the scope and content of finance especially investment have been fast evolving due to deregulation of financial markets, product innovations, and technological advancements, etc. As capital markets of the world are becoming more integrated, a solid understanding of finance quantitatively has become essential and critical for making astute financial decisions. Reflecting the growing importance of analytics as a discipline of finance, there is a sharp increase in the demand for analytical experts.

Hence, this course focuses on key tools that are needed for today's professional investor. Besides we will cover advanced concepts such as multiple regression, time series analysis as well as multifactor models that ultimately figure into the formation of hypotheses for purposes of testing. We will try to gain critical skills that challenge many professionals, including the ability to distinguish useful information from the overwhelming quantity of available data. Even though analytics is being applied and used in every aspect of finance, we will specifically concentrate on quantitative techniques with the investment practitioner in mind and is replete with examples, and practice problems that reinforce the learning outcomes and demonstrate real-world applicability.

The course is designed for graduate students in finance who have a good understanding of basic economics, accounting and corporate finance. If you are shaky on basic finance knowledge such as discounted cash flows, net present value beside in-depth statistics knowledge: variance, correlations, hypothesis testing, distributions, sampling, and simple regression, it is strongly recommended to get yourself up to speed with this material.

Course Objectives

By the end of this course, students should successfully be able to understand the framework for making investment decisions via using advanced quantitative analysis. The students will learn a spectrum of advanced topics in the area of data analysis such as the challenges faced by analysts in appropriately using and interpreting financial data, how to define and test a hypothesis by using appropriate test statistic, the interpretation of results, how to analyze the relation between variables, how to construct the multiple linear regression model and what the violations of regression assumptions, and model specifications are, calculate and evaluate the predicted trend value for a time series, time series models in depth such as nonstationary and autoregressive models as well as features and characteristics of random walk and covariance stationary processes, and unit root test. Besides, we will have introduction to types of multifactor models and study few major multifactor models such as Arbitrage Pricing Theory, Fama-French, and Carhart models.

Course Materials

Textbook:

Title: "Quantitative Investment Analysis", 3rd Edition, Wiley

Authors: DeFusco, R.; McLeavey D.; Pinto J.; Runkle D.

Reference Textbooks

Title: "Introduction to Time Series and Forecasting", 3rd Edition,

Springer Authors: Brockwell, P.; Davis, R.

Title: "The Basics of Financial Econometrics", 1st Edition, Wiley

Authors: Fabozzi, F.; Focardi, S.; Arshanapalli B.

Title: "Analysis of Financial Time Series", 3rd Edition, Wiley

Author: Tsay, R.

Title: "Applied Statistics and the SAS Programming Language",

4th Edition, Pearson Authors: Cody, R.; Smith, J

Lecture Materials

There will be lecture materials for each week. Each week, copies of these lecture materials will be available on course web site. Lecture notes and any other reading materials will be posted in the form of MS Word, Power Point and/or Adobe Acrobat files. It is your responsibility to print them out before/after the class.

Suggested End-of-Chapter Problems (Optional)

The course textbook has a set of problems at the end of each chapter. These questions are designed to help students assess their understanding of chapter topics. Some of these problems/questions will be selected from each chapter and will be posted on Carmen (unless appears on the following *Course Schedule*). Students should try to answer these problems after they finish reading a chapter to check their understanding of the topics covered.

Suggested Readings (Optional)

Wall Street Journal: www.wsj.com
Financial Times: http://www.ft.com/home/us
Bloomberg: www.bloomberg.com
Yahoo! Finance: http://finance.yahoo.com/
Freakonomics: http://freakonomics.blogs.nytimes.com/
Baseline Scenario: http://baselinescenario.com/
Real Time Economics (WSJ): http://blogs.wsj.com/economics/
Calculated Risk: http://www.calculatedriskblog.com/
Economy and Economics of Everyday Life: http://economix.blogs.nytimes.com/

Course Website

The course website is located on Carmen (https://carmen.osu.edu). A student must be registered for the course to access the course web site.

Important Resources on the Course Website:

- Course syllabus
- Supplemental course material used (or mentioned) in class
- Lecture notes (PowerPoint slides)
- Course announcements
- Optional Problem sets and solutions
- Detailed solutions for all suggested end-of-chapter problems in the course text
- Posted exam scores (privately for each student)
- Exam formulas
- **Logging in Carmen**: Be sure you are logging in to the course in Carmen each week, including weeks with holidays or weeks with minimal online course activity. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible.*

Course Technology:

Baseline technical skills necessary for this course

- Basic computer and web-browsing skills
- Navigating **Carmen**
- Working within a Publisher's website

Technology Support for Carmen

As instructor, my responsibility is the course content and evaluating performance. Please contact me about any concerns in these areas. However, I am generally not able to assist in matters relating to technology, connectivity or Carmen access. Such issues may be addressed directly to either Carmen Technical support or Help desk.

Hence sources of help are available from helpdesk@osu.edu (or by phone at 292-8976) and Carmen@osu.edu or 614-688-HELP at any time.

Course Requirements:

Attendance and Participation:

Attendance will be checked occasionally. You are responsible for all information covered in class. If you miss class, obtain the information missed. To enhance your understanding, **you should read the assigned material beforehand**. As a matter of professional courtesy, I expect an email or phone message, if you are unable to attend class.

Etiquette guidelines and professionalism will be followed in class. It is expected that students treat others, their ideas, and their time with respect by arriving class on time. Please mute phones, laptops, tablets and any other electronic devices. Laptops and tablets are permitted in class to be used ONLY for note taking and in-class assignments.

You are strongly encouraged to participate in this class. I encourage you to ask questions and participate in discussions. This makes classes more interesting. I also encourage you to give me any suggestions that you have about improving the course.

Assignments:

Each group assignment has specific purposes to build and develop essential skills to be a successful professional. Guidelines will be given for each assignment. It is the student's responsibility to seek out additional information for each assignment.

Assignments are due on the day specified by the instructor, please see the table in *Course Grading Policy* section for due dates. The late submission penalties are 15% reduction within 1 day, 30% reduction within 2 days. No assignments will be accepted after 2 days.

Exams:

There will be one comprehensive midterm and one COMPREHENSIVE final exam. The midterm and final exam questions might be drawn from the same pool of questions. All exams are closed-book and closed-notes. Each midterm exam will cover certain topics in the course. The topics and related textbook chapters covered by each exam can be found in the **Course Schedule.** The midterm and final exams will be 100 points each. The questions will involve both conceptual and calculation questions, based on material covered in class and from the suggested problems at the back of each chapter as well as suggested problems posted on Carmen, if any posted.

The suggested problems are intended to give students an idea of how actual exam questions will look and also an opportunity to check their understanding of quantitative concepts and techniques in finance. Each set of questions includes an answer key.

Students will be provided with a Formula Sheet for use in each exam. By giving students formula sheets at exams, students will not waste time in memorizing mathematical expressions hence they will concentrate to understand important analytical concepts.

Students should bring to each exam:

1. A financial calculator
2. A valid picture ID. You will not be permitted to take an exam without presenting a **valid photo ID**.
3. Several #2 pencils, which you will need for the "bubble sheet"

All exams are "closed book/notes." Except for a Formula Sheet provided by the proctor, students may not use any reference material to help them answer exam questions. Students will be given scrap paper at the exam. No student is permitted to use his or her own scrap paper.

Exam rules:

You should be in your seat 5 minutes before the exam starts. All electronic devices other than your calculator must be turned off and put away during exams. All other course materials must be out of sight. All hats and hoods must be off your head. Your exam grades will be posted on Carmen. Exams are NOT returned to the students, but you may view your exam during office hours.

Make-up Exams:

As a general rule, make-up exams are NOT given in this course. However, a student may be allowed to take a make-up exam, if in the opinion of the instructor, there are special or extenuating circumstances such as illness. If you are unable to take an exam because you are sick, you must provide me a doctor's confirmation in which it states that you are not in a condition to take an exam.

Without permission to take a make-up exam, failure to take an exam will result in grade of zero on the exam in question. Every effort should be made (e.g. email, voicemail, message with the Finance Department Office) to notify the instructor at least 24 hours in advance. The date/time of the make-up exam will be scheduled according to the instructor's schedule by the instructor.

Under no circumstances will a student be excused from an exam.

Course Grading Policy:

Your final course grade will be based on assignments, midterm and comprehensive final exam as shown in table below.

Assignment/Category	Due Date	Points	Percentage of Total Grade
Group Assignment 1	October 24th	100 pts	10%
Group Assignment 2	November 3rd	100 pts	10%
Group Assignment 3	November 21st	100 pts	10%
Group Assignment 4 (SAS Project)	December 4th	100 pts	10%
Midterm Exam	November 8th, Wednesday	100 pts	30%
Final Exam	December 6th, Wednesday	100 pts	30%

Total Course Grade = 0.30 x (Final Exam) + 0.30 x (Midterm Exam) + 0.10 x (Assignment 1) + 0.10 x (Assignment 2) + 0.10 x (Assignment 3) + 0.1 x (Assignment 4)

After the total course grade has been calculated for all students, the average for the class is calculated. If the course class average is below 75%, a curve adjustment is applied. The curve

adjustment equals 75% minus the course class average. If the course class average is equal or above 75%, a curve adjustment is not applied (that is curve adjustment is zero). **There will be NO extra credit work available in this course.**

The course grade will be converted to a letter grade for the course using the following grading scale:

Grading scale:

A	93 – 100	B+	87–89.9	C+	77–79.9	D+	67 –69.9	E Below 60
A-	90 – 92.9	B	83–86.9	C	73–76.9	D	60 –66.9	
		B-	80–82.9	C-	70 –72.9			

Prof. Pirim reserves the right to correct grades recorded on the course website, should he determine such entries were posted incompletely or incorrectly.

Academic Integrity Policy:

The Ohio State University's *Code of Student Conduct* (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the University, or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the University's *Code of Student Conduct* is never considered an "excuse" for academic misconduct, so I recommend that you review the *Code of Student Conduct* and, specifically, the sections dealing with academic misconduct.

If I suspect that a student has committed academic misconduct in this course, I am obligated by University Rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the University's *Code of Student Conduct* (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the University.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Accommodations for Accessibility:

Requesting accommodations

If you would like to request academic accommodations based on the impact of a disability qualified under the Americans with Disabilities Act and Section 504 of the Rehabilitation Act of 1973, contact your instructor privately as soon as possible to discuss your specific needs. Discussions are confidential.

In addition to contacting the instructor, please contact the Office for Disability Services at 614-292-3307 or ods@osu.edu to register for services and/or to coordinate any accommodations you might need in your courses at The Ohio State University.

Go to http://ods.osu.edu for more information.

Tentative Course Schedule

The following describes the **TENTATIVE** class schedule as *SAS Workshops will also be included in the schedule once the dates/times are defined*. The topics covered on each proposed day may change as the semester progresses, but the general order will not vary. Students are strongly urged to read the appropriate chapters BEFORE the lecture so as to learn more during the lectures. This will help your understanding of the concepts as they are discussed. Please also re-read the material after class.

Class Date	Topics, Readings, Assignments, Deadlines
Week 1 October 16 October 18	**Week 1:** *Course Introduction/Syllabus/Review of Linear Regression* (Chapter 8) and Multiple Regression and Issues in Regression Analysis (Chapter 9) Assignment for this week: 1. Read Multiple Linear Regression and Dummy Variables 2. Review lecture notes
Week 2 October 23 October 25	**Week 2:** Continued Multiple Regression and Issues in Regression Analysis (Chapter 9) & Introduction to Time Series Analysis (Chapter 10) Assignment for this week: 1. Read Violations of Regression Assumptions and Introduction to Time Series: Trend Models 2. Review lecture notes ***Group Assignment 1 is due on October 24***
Week 3 October 30 November 1	**Week 3**: Time Series Analysis (Chapter 10) Reading: Autoregressive AR Models Assignment for this week: 1. Read Autoregressive AR Models 2. Review lecture notes ***Group Assignment 2 is due on November 3***

Class Date	Topics, Readings, Assignments, Deadlines
Week 4 November 6 **November 8 (Midterm I)**	**Week 4:** Midterm Review Q&A Office Hours & Midterm I **Midterm Review Q&A** **Midterm Exam: Chapter 8 and materials covered to date from Chapter 9, and sections of Chapter 10. Remember to bring your financial calculator and several number 2 pencils.**
Week 5 November 13 November 15	**Week 5:** *Continued* Time Series Analysis Assignment for this week: 1. Read Random Walk, Unit Root Test and Moving Average Models for Forecasting and Seasonality 2. Review lecture notes
Week 6 November 20 **November 22 (Thanksgiving)**	**Week 6:** *Continued* Time Series Analysis Assignment for this week: 1. Read ARMA Model, AR Cond. HS, and Regressions with more than one Time Series 2. Review lecture notes ***Group Assignment 3 is due on November 21*** **NO CLASS**
Week 7 November 27	**Week 7:** Introduction to Multifactor Models (Chapter 11) Assignment for this week: 1. Read Multifactor Model Types, Arbitrage Pricing Theory and Fama-French Model

Class Date	Topics, Readings, Assignments, Deadlines
November 29	2. Download Chapter 11 slides 3. Review slides for Chapter 11 before class
Week 8 December 4 December 6	Week 8: *Continued* Introduction to Multifactor Models (Chapter 11) and General Review Reading: Chapter 11 Assignment for this week: 1. Re-read Chapter 11 2. Download slides for Chapter 11 3. Review Chapter 11 slides before class ***Group Assignment 4 is due on December 4*** General Review for Final Exam (Q&A)

Monday December 11 10:00am-11:45am

COMPREHENSIVE FINAL EXAM: Materials covered to date from the beginning of the semester, Chapters 8, 9, 10, and 11. Photo ID required. Remember to bring your financial calculator and several number 2 pencils.

https://registrar.osu.edu/scheduling/SchedulingContent/AU23Finals.pdf

GOOD LUCK.