



Dillard College of Business Administration

Syllabus: Data Modelling and Forecasting

ECON 5143-170

Fall 2023

Monday 7:00 pm to 9:50 pm

Dillard Building 129

Contact Information:

Instructor: Dr. Pablo A. Garcia-Fuentes

Office: Dillard Building 292

Office Hours: Monday and Wednesday 8:30 am to 10:00 am, and Tuesday 8:30 am to 10:30 am.

Also, by appointment (You are welcome to stop by at any time).

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Welcome:

Welcome to ECON 5143. It is a graduate course. MBA students are no longer undergraduate students. MBA students are treated as managers who are critical thinkers and problem solvers.

Text:

Hyndman, R.J., and Athanasopoulos, G. 2021. *Forecasting: Principles and practice*. 3rd edition. OTexts: Melbourne, Australia. OTexts.com/fpp3. (Required). The book is free online and can be accessed at [Textbook](https://otexts.com/fpp3).

Supplemental Texts:

Wickham, H. and Grolemund, G. 2017. *G. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data*. 1st Edition. O'Reilly: California, USA. The book is free online and can be accessed at [Rfordatascience](https://rfordatascience.com).

Wickham, H., Navarro, D., and Pedersen, T. Nodate. *Ggplot2: Elegant graphics for data analysis*. 3rd edition. Springer. The book is free online and can be accessed at [Ggplot2](https://ggplot2.tidyverse.org).

The supplemental texts focus on R programming. These books are great references for learning about R coding. They help students understand the R coding we will use in this course.

Software:

This course requires students to use R. The instructions on how to download R and install it in your computer are in the Appendix of the textbook, which can be accessed at [AppendixUsingR](#). Download and install R and RStudio. We will use RStudio.

Learning R:

The course introduces students to using R. The supplemental texts explain the R code used in the required text. One way to learn R programming is to run the chapters' programs, use the supplemental texts as reference, ask questions to the instructor, and invest enough time on it. The ideal scenario would be to take an R programming class first and then take this class, but there is no time for this. Therefore, students must invest enough time into learning R programming.

Computer operating system:

The instructor uses the Microsoft computer operating system. Students are responsible for submitting assignment documents/files that can be managed with the Microsoft operating system. The instructor will not be able to help students who own Mac computers due to different computer operating systems. I recommend you use a Microsoft operating system computer.

Copyright:

The class materials associated with this course are provided to facilitate student learning and are protected by the United States copyright laws. Dissemination or sale of the class material (including the World Wide Web) is not permitted. The class material is only available to students enrolled in the course that requires the use of the corresponding textbook. Students should abide by these restrictions. The publisher of the textbook owns the copyright for the class materials associated with this course.

Course Description:

This course gives students an introduction to forecasting methods using R. It helps students learn about graphing time series, time series decomposition, time series features, using forecasting tools, time series regression models, exponential smoothing, ARIMA models, dynamic regression models, forecasting hierarchical and grouped time series, advanced forecasting methods, and practical forecasting issues.

Suggestions to students:

ECON 5143 is a graduate course, which is a higher-level course and very different from undergraduate courses. To be successful in this class, students must spare at least two days a week to read the class materials, run and understand the chapter R-program, and do the homework. This is one of the toughest classes in your program. However, the instructor will be pleased to help you with any questions you may have. Do not hesitate to contact the instructor if you need help, Dr. Garcia-Fuentes's goal is to help students be successful.

Course Prerequisites:

Consent of the graduate coordinator.

Learning Goals:

The general objective of this course is to help students learn about modelling time series data and forecasting.

A. General Learning Goals:

1. Leadership. By engaging students in the analysis of time series data and forecasting, this course aims to contribute to developing students' ability to make more effective business decisions.
2. Critical Thinking. The students will demonstrate their critical thinking abilities by conducting analysis of time series data.
3. Communication skills. By engaging students in the analysis of time series data, this course aims to contribute to developing students' ability to communicate their analyses in a professional manner.
4. Integrate knowledge across business disciplines. By engaging students in the analysis of time series data, this course aims to contribute to developing students' ability to integrate data modelling and forecasting methods with other business disciplines.
5. Personal Responsibilities. The students will demonstrate their abilities in connecting choices, actions, and consequences that are related to economic reasoning and ethical decision-making when conducting analysis of time series data.

These general learning goals either represent or are related to those established by the Dillard College of Business Administration. The learning goals represent the skills that graduates will carry with them into their careers. While assessing student performance in obtaining these general learning goals, the College seeks to assess its programs. The assessments will assist us to improve our curriculum and curriculum delivery.

B. Course Specific Learning Goals:

- Learn about graphing time series data.
- Learn about time series decomposition.
- Learn about time series features.
- Learn about forecasting tools.
- Learn about time series regression models.
- Learn about exponential smoothing.
- Learn about exponential smoothing.
- Learn about ARIMA models.
- Learn about dynamic regression models.
- Learn about forecasting hierarchical and grouped time series.
- Learn about advanced forecasting methods.

- Learn about practical forecasting issues.
- Learn about R programming and applications to data modelling and forecasting.

Teaching Method:

The method to present the class material will be based on lectures and discussions. The student is allowed to ask questions at any time during the lecture on a point that is not understood. The instructor has academic freedom to bring in class material and technology to the class in his own way. In this class, you will use the internet to access D2L to have access to the class materials. D2L will be used for posting announcements and scores, and perhaps bonuses.

Course Policies:

A. Attendance Policy:

Students are expected to attend all scheduled classes for this course given the university attendance policy. Attendance is important because of announcements of specific course requirements, instructions for assignments, and more detailed discussions of critical material that are covered in class. Entering class late will not be allowed because the doors will be locked when class begins. Entering class late or departing early is not appropriate (please be respectful and fair to your classmates). Come to class on time. To avoid disturbing the class, you are not to walk in and out of the classroom during class except for an emergency. I may also consider your tendency of class participation in favor of a better grade if you only miss a higher score by a narrow margin.

Attendance will also be checked through assignment submissions. Therefore, missing 2 classes from 08/28/2023 to 10/30/2023 is considered excessive by the instructor; therefore, students who reach this level of missed classes will be dropped by the instructor with a grade of “F”, given the university attendance policy. Additionally, missing 3 classes during the semester is also excessive; therefore, students who reach this level of missed assignments will get a final grade of “F”, given the university attendance policy, as shown in the Student Handbook and Activities Calendar which may be found at [Handbook](#). In addition, the classroom is not a place for children and therefore cannot be used in lieu of daycare or babysitting. If you attend with a child, you will be dismissed from class and counted as absent.

B. Other Related Policies

Graduate Course:

Econ 5143 is a graduate course and students are treated as graduate students and managers. This is different from being an undergraduate student. Therefore, students should comply with the course policies.

Academic Integrity:

Regarding academic honesty, students are referred to the “Student Honor Creed” (See the Student Handbook).

Declaration of AI use:

Students must declare their use of artificial intelligence (AI) when they use AI in any work that is required in this course. Failure to declare the use of AI will be considered academic dishonesty as defined in the Student Handbook. Using AI responsibly means that you must have control over it to avoid bias (Dr. Garcia-Fuentes does not use AI in my scholarly work).

Please add the statement below at the end of your homework/assignment to declare the use of AI.

Statement: I “your name here” declare that have used the following AI tools/services “Tool names/services here” in this homework, assignment, exam or the like”. I also state that I reviewed and edited the content as needed and take full responsibility for it.

If the instructor finds out that a student used AI and failed to declare its use, the student will receive zero credits on the assignment.

This policy does not apply to the use of basic tools to check spelling and grammar.

Exam Policies:

Exam policies are related to academic integrity and they can also be stated on the first page of the test.

Americans with Disability Act:

This class follows the guidelines suggested by the Center for Counseling and Disabilities Services for those students who qualify for disability services. Please notify the instructor of your special needs during the first week of classes (See the section on “Disability Support Services” in the Student Handbook).

Dillard Building Classroom Policy:

- No food or drink is allowed in the classroom.

Syllabus Change Policy:

- This syllabus is a guide for the course and is subject to change.

Correspondence:

All correspondence regarding class issues must be conducted in person or by email using your Midwestern State University (MSU) email only. I will not return answers to questions to other email accounts. Grades will be posted on D2L and on MSU Banner. I will not discuss grades or class standing over the phone or by emails. Since email is often the most convenient means of communication, it is recommended that students use and regularly monitor their MSU email account. Grades will not be transmitted electronically (e.g., emails).

I suggest that you link your D2L email with your MSU email, so the messages sent through D2L will be forwarded to your MSU email. To do this,

- Log in to D2L.
- Click on your name on the right upper corner of the screen.
- Click on “account settings”.
- Click on “email”.
- Check “Forwarding incoming messages to an alternate email account” and enter your email in the box.
- Click on “save and close”.

Netiquette: Communication Courtesy Code:

Students are expected to follow rules of common courtesy in all email messages, class discussions, lecture hall posts, chats, etc. If I consider any of them to be inappropriate or offensive, I will forward the message to the Chair of the department and the online administrators and appropriate actions will be taken.

Deadlines:

We cannot totally rely on cyberspace—emails get lost, and servers disconnect temporarily. Do not wait for the last hour to do your homework. Reply and check for replies on every email sent and received. The student is responsible for checking deadlines on D2L and for submitting the work to the instructor on time. *I will not reply to emails regarding homework issues during the last 7 hours prior to the deadline.*

Proctoring of exams

In case that the course changes to online mode, the course can use online proctoring such as ProctorU or a similar software, and students will be required to pay the proctoring fees when taking the exams. In addition, students will be required to have a webcam.

Webcams

In case the course changes to online mode because of Covid-19, students will be required to have access to a web cam.

Classroom decorum:

- Free discussion, inquiry, and expression are encouraged in this class.
- Classroom behavior that the instructor considers interferes with either (a) the instructor’s ability to conduct the class or (b) the ability of students to benefit from the instruction is not allowed.
- Routinely entering class late or departing early is not allowed. This will cause the student to lose his/her attendance.

- Use of cellular phones is not allowed in this class. Cellular phones must be turned off and away from your desk. In the event of a situation where a student legitimately needs to carry a cellular phone to class, prior notice and approval of the instructor is required.
- The first time a student violates any of the above rules, the instructor will give the student a verbal warning. The second time a student violates any of these rules, the instructor will ask the student to leave the room and a 20-point penalty on the final score will be assessed.
- *A 20-point penalty on the student's final score will be assessed for violating each of these rules.*
- Classroom behavior which is deemed inappropriate and cannot be resolved by the student and the faculty member will be handled as per the Code of Student Conduct as shown in the Student Handbook.

Exams, Coursework and Grades

Exams: During the semester, there will be a midterm exam and a comprehensive final exam (200 points each). The exams can be take-home exams. The two-exam scores will be for 400 points or 66.7% of your course grade. The exam's instructions and policies will be stated on the first page of the exam. The instructor has academic freedom to include any type of question in the exams.

If a student misses an exam without prior approval from the instructor, please do not expect a make-up exam. With the instructor's prior approval, you may take a make-up exam during the week of finals. If you anticipate a valid reason for missing an exam, please inform the instructor in advance by email. An unexcused absence from an exam will result in a score of zero on that exam and may be compensated for by counting your final exam in its place with the instructor's approval, and a 20% penalty on that exam's score will be assessed. The exam dates are noted in the Tentative Course Schedule in this syllabus. Any changes to those dates will be announced as soon as possible and posted prominently on D2L.

Assignments: There will be 11 assignments corresponding to the chapters that will be covered during the semester. The assignments will be submitted through D2L. The instructor has academic freedom to include any type of question in the assignments. There will be no make-up assignments under any circumstances. The student is responsible for having an appropriate internet connection. If you do not have an appropriate internet connection and fail to submit an assignment, do not expect a make-up assignment. You are expected to complete each assignment by the deadline. You will have an adequate amount of time for each assignment, and you must not fall behind. If you miss an assignment, you will earn zero credits. Your score for all assignments will be 200 points.

Grades will not be transmitted electronically (e.g., emails). Grades will be posted on D2L and on MSU Banner. I will not discuss grades or class standing over the phone or by emails. You are welcome to come by my office to discuss your grade.

Course Grade:

| Course work | NA | Grade Scale | Percentages* | NA |
|------------------|---------|---------------|--------------|----|
| Assignments (11) | 200 pts | 540-600 pts | 90% & above | A |
| Exam 1 | 200 pts | 480-539 pts | 80%-89% | B |
| Exam 2 | 200 pts | 420-479 pts | 70%-79% | C |
| Total | 600 pts | 360-419 pts | 60%-69% | D |
| NA | NA | below 360 pts | below 60% | F |

* Percentages are only given for relative levels. Your final score is a total of all your exam, quiz, and homework scores with any bonus points added separately. Therefore 89% is not 1 point short of an A. 89% is only 534 points, which is 6 points short of an A.

Senate Bill 11

Senate Bill 11 passed by the 84th Texas Legislature allows licensed handgun holders to carry concealed handguns on campus, effective August 1, 2016. Areas excluded from concealed carry are appropriately marked, in accordance with state law. For more information regarding campus carry, please refer to the University's webpage at [campus handgun policy](#).

Outline of the course

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Fall 2023

(Subject to changes and additional readings)

| Week and dates | Chapter | Topic |
|------------------|-----------|--|
| Week 1 (Aug 28) | 3* | Syllabus and D2L; Data visualization |
| Week 2 (Sep 4) | NA | Holiday; Run R to get familiar with it |
| Week 3 (Sep 11) | 2 | Time series graphics |
| Week 4 (Sep 18) | 3 | Time series decomposition |
| Week 5 (Sep 25) | 4 | Time series features |
| Week 6 (Oct 2) | 5 | Forecaster's toolbox |
| Week 7 (Oct 9) | 7 | Time series regression models |
| Week 8 (Oct 16) | 8, Exam 1 | Exponential smoothing; Exam 1: chapters 2, 3, 4, 5, and 7, Due on 10/23/2023 |
| Week 9 (Oct 23) | 9 | Arima Models |
| Week 10 (Oct 30) | 10 | Dynamic regression models |
| Oct 30, 2023 | NA | Last day for "W" at 4:00pm. Drops after this deadline receive an "F" |
| Week 11 (Nov 6) | 11 | Forecasting hierarchical and grouped time series |
| Week 12 (Nov 13) | 12 | Advanced forecasting methods |
| Week 13 (Nov 20) | 12 | Advanced forecasting methods; Thanksgiving Holiday (11/23) |
| Week 14 (Nov 27) | 13 | Practical forecasting issues |
| Week 15 (Dec 4) | 13 | Practical forecasting issues |
| Final Exam | NA | Monday, Dec 11, 2023, 11:59pm |

Note: The instructor can change the exam dates and locations if it is necessary. Chapter 3* is chapter 3 from "Wickham, H. and Grolemund. 2017. *G. R for Data Science: Import, Tidy, Transform, Visualize, and Model Data*. 1st Edition. California: O'Reilly Media, Inc."