Course Information

- **Course Number and Title:** STA 4853 Time Series Analysis for Business, Data Science, and Economics
- **Credit Hours:** 3 credits
- **Academic Term:** Spring 2026

Instructor Information

- **Instructor:** Dr. Paul Hettler
- **Office Location:** IST 2073
- **Office Hours:** Monday and Wednesday 10-11am, Tuesday 12:30-2pm and by appointment
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Course Delivery and Course Description

- **Delivery Mode:** hybrid; face-to-face meeting: Thursday, 1-2:15 pm, IST-1003
- **Official Catalog Course Description:**
  - The objective of the course is to develop students' ability to build models of time series data appropriate to the properties exhibited by the data, apply appropriate techniques to forecast future values, conduct forecast validation, and analyze the strengths, weaknesses, and limitations of forecasts in their intended use.
  - **Course Prerequisites**: STA 3036 Probability and Statistics 2 for Business, Data Science and Economics

Required Texts and Materials:

Wooldridge, J. (2024). *Introductory Econometrics: A Modern Approach*. 7th ed. Cengage Learning. (Any version since 2008 will do just fine. I suggest you look for a low-cost used or electronic option. There is a pdf version of the 5th edition available online at https://jaimedv.com/eco/4c1-ecomet/jeffrey-m-wooldridge--econometrics--book.pdf)

Shmueli, G. & J. Polak. (2024). *Practical Time Series Forecasting with R: A Hands-On Guide.* 3rd ed. Axelrod Schnall. (You can purchase this on Amazon at https://a.co/d/cBbyDO2. Other textbook resources can be found at https://forecastingbook.com).

Hyndman, R. J., & Athanasopoulos, G. (2018). *Forecasting: principles and practice*. 2nd ed. OTexts. (Available free online: https://otexts.com/fpp2/)

Course Objectives and Outcomes

- **Course Objectives:**
  - Familiarize the learner with concepts and techniques in time series analysis and forecasting.
  - Apply statistical procedures in Excel and R.
  - Effectively communicate results to a variety of stakeholders.

- **Course Learning Outcomes:**
  - At the end of the semester, learners will be able to:
    1. Use appropriate software to analyze and forecast a time series.
    2. Identify important properties of a time series.
    3. Model a time series.
    4. Construct and validate forecasts.
    5. Evaluate strengths and weaknesses of a forecast.

Alignment with Data Science and Business Analytics Program Outcomes

Data Science Program Level Outcomes	Course Learning Outcome and Learning Level[*]				
	1	2	3	4	5
(1) Identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.	Apply	Analyze	Apply	Apply	
(2) Formulate or design a system, process, procedure or program to meet desired needs.	Apply		Apply	Create	
(3) Develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions.		Analyze	Apply	Create	Evaluate
(4) Communicate effectively with a range of audiences.				Create	Create
(5) Understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts.				Apply	Apply
(6) Function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.	Evaluate			Evaluate	Evaluate

Business Analytics Program Level Outcomes	Course Learning Outcome and Learning Level[*]				
	1	2	3	4	4
(1) Apply current business analytics concepts, techniques, and practices to solve business problems.	Apply		Apply	Apply	
(2) Analyze a given business problem using appropriate analytics techniques to generate insights and solutions.		Analyze		Create	Evaluate
(3) Communicate effectively insights, analysis, conclusions, and solutions to a diverse audience.				Create	Create

[*] learning level as described in Bloom's taxonomy and Anderson and Krathwohl's taxonomy.

Assignment/Evaluation Methods

Your course grade will be determined by your performance on several different evaluations.

- *Readiness Quizzes:* Short online quizzes will be given each week to assess your understanding of new concepts as they are introduced (via the online reading assignments, videos, etc.). The primary purpose is to confirm that everyone is ready to proceed with our in-class applications of the concepts. **The quizzes account for 5% of the course grade.** These must be completed before class each Thursday. They cannot be made up. Your highest 10 quiz grades count towards your final grade.

- *Labs/In-class Activities:* During the first week of class, you will be assigned to a team of 4-6 students. Most of our in-person class time will be devoted to these 'labs' (where you'll be given data and be asked to solve a series of problems with it), etc. Different activities have different point values. **Collectively, the in-class activities account for 15% of your course grade.** You must be present to receive credit for in-class assignments. (Typically, in-class activities cannot be 'made up'; however, they will not count against you if you miss an activity due to an excused absence).

- *Problem Sets:* Problem Sets will be assigned as a way both for you to practice the content that we are learning as well as a (formative) way to assess your progress. You should invest significant time in these assignments. You are encouraged to work with other students; however, if you do not push yourself to work the problems on your own first, you will cheat yourself of the best opportunity to learn the material. Since you have time, neatness and organization count in grading. Since the problem sets are intended to facilitate, not evaluate, learning, correctness is judged leniently. You must show a good faith effort on all parts of the assignment, with supporting work and evidence of careful thought and significant time. **The Problem Sets account for 15% of the course grade.**

- *Midterm Exam:* A midterm exam will be offered during the term (see tentative calendar). The exam may be a combination of analytical problems, essays, short answer, true/false and multiple-choice questions. It may have both an in-class and take-home (or online) component. **The midterm exam accounts for 15% of the course grade.**

- *"Final" Exam:* The final exam (which is not cumulative) will be offered during the final exam period as scheduled by the registrar. **The final exam accounts for 15% of the course grade.**
- *Projects:* You will complete several short projects during the course, applying course concepts/techniques. These are the ultimate summative assessments in this course. More details will be provided later. **The project accounts for 35% of the course grade.**

Grading Scale

This course is designed to be very rigorous and demanding. You are expected to work hard, actively participate in class, ask questions when you have any doubts, and perform to the very best of your ability. Although the material can be challenging, the purpose of this course is to teach you something about time series analysis and forecasting, not to destroy your GPA. Grading will be stringent; however, I strive to grade in the fairest, most unbiased way possible.

The course grade will be computed based on your performance on each assignment, exam, etc. using the following weights:

	Percent of final grade
Labs/In-Class Activities	15%
Readiness Quizzes	5%
Problem Sets	15%
Midterm	15%
Final Exam	15%
Projects	35%
TOTAL	100%

Your course grade will be computed using the following grading scale:

Grade	Percentage
A	93.0% +
A-	90.0% - 92.9%
B+	87.0% - 89.9%
B	83.0% - 86.9%
B-	80.0% - 82.9%
C+	77.0% - 79.9%
C	73.0% - 76.9%
C-	70.0% - 72.9%
D+	67.0% - 69.9%
D	63.0% - 66.9%
D-	60.0% - 62.9%
F	59.9% or less

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center**: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).
    - **Knack Tutoring**: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit https://www.joinknack.com/student/florida-polytechnic-university and sign in with your student account.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.

- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit www.floridapoly.edu/writingcenter.

Civility and Collegiality

Faculty and students come to the university for the same reason, which is to participate in a highly professional educational environment. To that end, both students and faculty are expected to treat each other with mutual regard and civility. Communication, written, oral and behavioral, between faculty and students must remain respectful. Within and outside of the classroom, students must refrain from derogatory comments toward the faculty member and their fellow students, and faculty as well must refrain from derogatory comments toward their students. Faculty and students should address each other with respect, in accordance with the wishes of the faculty and the students: for example, no one should be addressed by their last name alone.

Faculty from the outset of a course can and should specify what constitutes activities and behavior that take away from, that diminish, the educational environment. An individual student's distracting behavior impedes the education of fellow students, which itself is a form of disrespect. Civility and collegiality also include respecting each other's time: for example, neither students nor faculty should arrive late to class (unless unforeseen, pressing circumstances prevail); faculty should be present at the posted office hours; and students and faculty should be punctual when meeting times are scheduled. In more general terms, collegiality means respecting the right of both faculty and students to participate fully and fairly in the educational enterprise.

Course Policies
- **Attendance**
  - Students in **face-to-face (this includes labs and C-courses)** courses are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" (University Policy, FPU-5.0010AP).
  - Students are responsible for all materials/content covered (even that which may not be in the textbook) if they miss class.
  - Students must be present in class to receive credit for In-class activities.
  - Missing exams or other in-class assessments without advance notice will result in a grade of 0 for the missed assessment.
  - I understand that stuff happens, so there is some forgiveness for an occasional absence, as long as you are almost always there. I reserve the right to lower a student's course grade due to habitual absences.
  - **Students Feeling Sick:** Students should not come to class if they are feeling ill, particularly if experiencing symptoms of COVID-19, another respiratory infection, or if you have been directed by a health professional to quarantine. Please inform your instructor of the reason for your absence before class, if possible.
  - **Lateness:** You are expected to make every effort to be on time to class. If for some reason you must be late, try not to disturb others while entering the classroom--take an empty seat near the door. Don't trip over half of your classmates' book bags, coats, purses, etc. trying to get to "your" seat.

- **Participation**
  Because this is an advanced-level time series course, students are expected to come to each face-to-face session prepared and ready to participate. This includes completing assigned readings, watching lecture videos, and attempting problems *before* class. Active participation—such as asking questions, contributing to discussions, and engaging in problem-solving—is a key component of the learning process.

  I also encourage students to ask me questions when something is even the slightest bit unclear (and especially when you are completely confused!). Please do not be afraid to interrupt a lecture or team-based activity for a further clarification. Chances are you are not the only one with the same question. Also, don't hesitate to speak up if you feel you have something to add that would further the current discussion or enhance the understanding of the rest of the class.

  The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (with the exception, of course, for those who have an

authorized accommodation requiring such devices). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

- **Late Work/Make-up work**
  Except in extenuating circumstances (e.g. documented illness, etc.) work that is to be completed and turned in during class (e.g. team-based learning assignments) cannot be made up and are not accepted late (however, if you have an excused absence, missing an assignment will not affect your grade). Other assignments (e.g. papers, Problem Set) that are submitted late will be penalized 10% per day (or part of a day) if submitted past their due date, without advanced arrangements. Missing an in-class exam without advanced notice will result in a 0 grade.

- **Use of Artificial Intelligence (AI) in This Course**
  The use of generative AI tools (such as ChatGPT, Claude, or other large language models) may be appropriate in some parts of this course when used responsibly and transparently. Students are encouraged to explore how such tools can enhance learning, idea generation, or revision, but **AI should not be used to replace original thinking or bypass assigned work.**

  Unless otherwise specified, all submitted assignments must reflect your own understanding and effort. If you use AI tools to assist in brainstorming, revising, or practicing concepts, you must **clearly disclose** how the tool was used (e.g., in a footnote or appendix). Undisclosed or inappropriate use of AI may be considered a violation of academic integrity policies.

  If you are unsure whether AI use is appropriate for a specific assignment, **please ask**.

University Policies

Reasonable Accommodations
The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS) facilitates reasonable accommodation for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodation. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; www.floridapoly.edy/disability.

Accommodations for Religious Observances, Practices and Beliefs
The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX
Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity
Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures
Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance.

Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). *Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is **prohibited**.*

Course Schedule

Important Dates: https://floridapoly.edu/academics/academic-calendar/index.php

Week	Topic/video lectures	Reading/Assignments
Week 1 Online	Regression Review, R Basics	See Canvas Quiz 1
Jan 15	Team building Regression lab	Team Contract
Week 2 Online	What is Time Series Data, Time series regression	W-Chpt 10, PTSF-Chpt 2 Quiz 2
Jan 22	Time Series Visualization lab	
Week 3 Online	Continued discussion of time series regression	W-Chpt 10 Quiz 3
Jan 29	Time Series data in R lab	Problem Set 1
Week 4 Online	Intertemporal dependence, stationarity	W-Chpt 11 Quiz 4
Feb 5	Autocorrelation lab	
Week 5 Online	Continued discussion of intertemporal dependence	W-Chpt 11 Quiz 5
Feb 12	Time series processes lab, discuss Project 1	Problem Set 2
Week 6 Online	Forecasting intro	PTSF-Chpt 1 Quiz 6
Feb 19	Forecasting examples	
Week 7 Online	Forecast evaluation	PTSF-Chpt 3 Quiz 7
Feb 26	Data partitioning lab	Problem Set 3
Week 8 Online	Overview of forecast methods, review, catch up	PTSF-Chpt 4 Quiz 8
Mar 5	Midterm exam	Midterm
Week 9 Online	Smoothing models	PTSF-Chpt 5 Quiz 9
Mar 12	Smoothing lab part 1	Project 1
Mar 16-20	SPRING BREAK	
Week 10 Online	Smoothing models continued	PTSF-Chpt 5 Quiz 10
Mar 26	Smoothing lab part 2	Problem Set 4
Week 11 Online	Regression based forecasting models	PSTF-Chpt 6 W-Chpts 12 & 18 Quiz 11
Apr 2	Regression forecasting lab part 1	
Week 12 Online	Regression based forecasting, continued	Quiz 12
Apr 9	Regression forecasting lab part 2, discuss Project 2	Problem Set 5
Week 13 Online	ARMA and ARIMA modeling	PSTF-Chpt 7 W-Chpts 12 & 18 Quiz 13
Apr 16	Identifying ARIMA processes lab	
Week 14 Online	ARIMIA modeling, continued	Quiz 14
Apr 23	ARIMA forecasting lab, discuss Project 3	Project 2 Problem Set 6
Week 15	Review, catch up, special topics	

Online		
Apr 30	Review, catch up, project work	
Final Exam	Final as scheduled by registrar	Project 3 "final" exam

All dates are tentative and subject to change. Indicated readings are from the Wooldrigdge textbook (W) or Shmueli et al. textbook (PTSF). Other readings will be made available for each unit via Canvas.