

UNIVERSITY COLLEGE SYLLABUS



SCHOOL OF: *Engineering and Computer Science*
SUBJECT CODE: *ANLT*
COURSE NUMBER: *207*
COURSE NAME: *Time Series Analysis*
SEMESTER: *Spring 2020*
NUMBER AND TYPE OF UNITS: *1*
COURSE TIME AND LOCATION: *See Course Outline and Schedule*
INSTRUCTOR NAME: *Art Telkamp*
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Phone: 949-422-5338 (if urgent; text first please)

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COURSE DESCRIPTION

This course introduces the theory and application of statistical methods for the analysis of data that have been observed over time. Students will learn techniques for working with time series data and how to account for the correlation that may exist between measurements that are separated by time. The class will concentrate on both univariate and multivariate time series analysis, with a balance between theory and applications. Students will complete a time series analysis project using a real-world scenario and data set.

PREREQUISITES

Machine Learning for Data Science (ANLT 222).

COURSE OBJECTIVES

After successfully completing this course, you will be able to:

1. Describe basic time series concepts and define terminology.
2. Select time series methods appropriate to the stated business goals.
3. Apply a suite of time series methods to their own data using a high-level numerical analysis language.
4. Concisely summarize results of time series analysis.
5. Analyze univariate and multivariate time series data using available software.
6. Effectively conduct a forecasting analysis for real-world business scenarios and data sets.

TEACHING METHODOLOGY

This course addresses a broad range of time series topics in a total of 15 hours instruction; however, plenty of time has been allotted in each session for questions/answers and discussion. For the benefit of enhanced understanding, student engagement and participation is expected and encouraged.

LEARNING RESOURCES

We will be referencing code and data from this e-book:

Introduction to Time Series Forecasting with Python by Jason Brownlee

The following books are recommended if the student wishes to dig deeper into time series analysis theory and gain a more complete understanding:

Time Series Analysis and Its Applications – With R Examples by Robert H. Shumway and David S. Stoffer

New Introduction to Multiple Time Series Analysis by Helmut Lütkepohl

BEHAVIORAL EXPECTATIONS

Students are expected to attend all class and WebEx sessions. Students who are unable to attend a scheduled class meeting for whatever reason must inform their instructor and gain approval for their impending absence in advance. Students are expected to make up the material covered when they are absent, and they are responsible for being aware of any announcements made during their absence(s).

EVALUATION METHODOLOGY

There will be 4 assignments, and no final exam. All grading will be based on these 4 assignments. The objective of these assignments is for the student to better understand the material and application of the concepts discussed during lecture. All assignments must be submitted on Canvas. Late assignments will not be accepted.

Copies of student work may be retained to assess how the learning objectives of the course are being met.

GRADING SCALE

A	100 - 93
A-	92 - 90
B+	89 - 87
B	86 - 84
B-	83 - 80
C+	79 - 77
C	76 - 74
C-	73 - 70
D+	69 - 67
D	66 - 60
F	< 60

COURSE OUTLINE

1	Ordinary Least Squares (OLS) Regression & Statistics Review
2	Autoregressive (AR) & Moving Average (MA) Processes
3	Stationarity, Causality, and Invertibility
4	Detrending, Deseasonalizing, and Smoothing
5	The Autocorrelation Function (ACF) & Partial Autocorrelation Function (PACF)
6	ARIMA Modeling & The Box-Jenkins Method
7	Forecasting
8	Vector Autoregression (VAR) & Granger Causality
9	Cointegration & Vector Error Correction Modeling (VECM)
10	Autoregressive Conditional Heteroskedastic (ARCH)/GARCH Modeling

POLICIES

Attendance:

Students are expected to attend all class and WebEx sessions. Students who are unable to attend a scheduled class meeting for whatever reason must inform their instructor and gain approval for their impending absence in advance. Students are expected to make up the material covered when they are absent, and they are responsible for being aware of any announcements made during their absence(s).

Honor Code:

The Honor Code at the University of the Pacific calls upon each student to exhibit a high degree of maturity, responsibility, and personal integrity. Students are expected to:

- act honestly in all matters

- actively encourage academic integrity
- discourage any form of cheating or dishonesty by others
- inform the instructor and appropriate university administrator if she or he has a reasonable and good faith belief and substantial evidence that a violation of the Academic Honesty Policy has occurred.

Violations will be referred to and investigated by the Office of Student Conduct and Community Standards. If a student is found responsible, it will be documented as part of her or his permanent academic record. A student may receive a range of penalties, including failure of an assignment, failure of the course, suspension, or dismissal from the University. The Academic Honesty Policy is located in Tiger Lore and online at

<http://www.pacific.edu/Campus-Life/Safety-and-Conduct/Student-Conduct/Tiger-Lore-Student-Handbook-.html>

Accommodations for Students with Disabilities:

If you are a student with a disability who requires accommodations, please contact the Director of the Office of Services for Students with Disabilities (SSD) for information on how to obtain an Accommodations Request Letter.

3-Step Accommodation Process

1. Student meets with the SSD Director and provides documentation and completes registration forms.
2. Student requests accommodation(s) each semester by completing the Request for Accommodations Form.
3. Student arranges to meet with his/her professors to discuss the accommodation(s) and to sign the Accommodation Request Letter

To ensure timeliness of services, it is preferable that you obtain the accommodation letter(s) from the Office of SSD as early as possible in each term. After the instructor receives the accommodation letter, please schedule a meeting with the instructor during office hours or some other mutually convenient time to arrange the accommodation(s).

The Office of Services for Students with Disabilities is located in the McCaffrey Center, Rm. 137. Phone: 209-946-3221. Email: ssd@pacific.edu. Online: <http://www.pacific.edu/disabilities>

COURSE OUTLINE AND SCHEDULE

Session	Day	Date	Time	Location	Topics (subject to redistribution)
1	Sat	15-Feb	10:00 - 12:00	SF Campus	Statistics Review / AR & MA Processes
2	Tue	18-Feb	18:00 - 20:00	WebEx	Stationarity, Causality, and Invertibility
3	Tue	25-Feb	18:00 - 20:00	WebEx	Detrending, Deseasonalizing, and Smoothing
4	Sat	29-Feb	10:00 - 12:00	SF Campus	ARIMA Modeling & Box-Jenkins Method
5	Tue	3-Mar	18:00 - 20:00	WebEx	Forecasting
6	Tue	17-Mar	18:00 - 20:00	WebEx	VAR Modeling & Granger Causality
7	Sat	21-Mar	10:00 - 12:00	SF Campus	Cointegration & VECM
8	Tue	24-Mar	18:00 - 19:00	WebEx	ARCH/GARCH Modeling