San Jose State University/Department of Economics
ECON 138, Business and Economic Forecasting, Sec 1, Spring, and 2020

Contact Information

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Office Hours:	Th 11am - 12pm in-person
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Class Days/Time:	T Th 1:30pm – 2:45pm
Classroom:	DMH 161

Course Description

People routinely plan around the weather forecast, and are often displeased when it unfolds differently than expected. Similarly, movements in the economy matter to individuals, businesses, and governments, and these economic agents are likewise uncomfortable with unexpected changes in the economy. Thus, reliable ways to forecast economic variables are useful.

The purpose of this course is to introduce an array of methods and practices for analyzing time-series data and generating statistical forecasts. This will be accomplished through a mix of theoretical discussions and software-based applications to real-world problems. As will become clear, many familiar methods of inference are not well adapted to analyzing data with a time component, although some time-series methods do have close cross-sectional analogues.

Who should take this course? Economics 103 (Introduction to Econometrics) has long been the flagship statistical course for the economics major; this course is intended as its companion. Any student with graduate school aspirations should take this course (as well as ECON 103). Students

interested in the quantitative aspects of business decisions will benefit greatly from this material as well. Practicing business professionals and consultants value these skills.

You are encouraged to use R. R is free, available on almost every operating system, and there are thousands of add-on packages to do almost anything you could ever want to do. I recommend you use R with RStudio.

However, you may use any package you wish, such as Eviews, Excel, SAS, Stata, GRETL. You may also use Mathematica or Matlab. Mathematica can be downloaded free from the eCampus website by any SJSU student. A good introduction to statistical packages can be found from http://www.ats.ucla.edu/stat/. Let me emphasize that you will be on your own for support with any package except R. Also, you are strongly discouraged from relying exclusively on Excel.

It is somewhat of a hands-on course in the sense that you will be given empirical exercise and asked to do calculations. Empirical exercises are designed to provide students with hands-on experience with R, time series models and real data.

Course Structure

This course is designed to provide a hybrid experience, including both face-to-face and online activities.

Contact time will be divided in the following way:

50% face-to-face

50 % online

Online sessions will be a blend of self-paced and group activities using Canvas. Activities will consist of reading, voiceover PowerPoint lectures, online quizzes, discussion forums, and email.

Face-to-face sessions will be held on the San Jose State campus in DMH 161 only on Thursdays.

Course Goals and Learning Objectives

CLOs	PLOs	Assignment
1. Explain a variety of statistical model and filtering tools for time series and identify correct methods to analyze these models.	PLO 3 research methods PLO 4 Specialist Area- Quantitative Methods PLO 5 Communication	Learning outcomes are satisfied by weekly problems sets that contain two parts. The theory part helps students to gain basic understanding of the time series analysis. The application part asks students to do practical time series analysis using R. Seven quizzes are designed in a way such that students have to correctly identify the methods and apply them to real world problems.
2. Choose an appropriate ARIMA model for a given set of data and fit the model using an appropriate package.	PLO 4 Specialist Area- Quantitative Methods	Weekly homework and quizzes
3. Be able to apply R in time series/forecasting situations	PLO 4 Specialist Area- Quantitative Methods	Such expected learning outcome are satisfied by the weekly R project which requires that students form an interesting forecasting question, gather relevant data, apply appropriate methods, and write up their

	PLO 4 Specialist	results in the form of a well-written report.
4. Compute forecasts for a variety of linear methods and models.	Area- Quantitative Methods	Weekly homework, quizzes and final project

Recommended Texts/Readings

The course material will be based on a set of slides being prepared by the instructor, but one primary textbook is highly recommended and it's FREE!

Hyndman and Athanasopoulos, Forecasting Principles and Practice, (online), http://otexts.org/fpp2/

Other recommended books:

1. Box, G.E.P., Jenkins, G.M. and Reinsel, G.C., Time Series Analysis: Forecasting and Control, 5th Edition, Prentice Hall, New Jersey.

2. Tsay, R.S., Analysis of Financial Time Series, 2nd Edition, Wiley Series in Probability and Statistics.

3. Brockwell, P.J. and Davis, R.A., Introduction to Time Series and Forecasting, 2002 edition, Springer-Verlag, New York.

4. Diebold, F.X. (2015), Forecasting, Department of Economics, University of Pennsylvania, **http://www.ssc.upenn.edu/~fdiebold/Teaching221/Forecasting.pdf**

Coursework Commitment

This is a four-unit undergraduate level course. SJSU classes are designed such that in order to be successful, it is expected that students will spend a minimum of three hours per unit per week, including participating course activities, completing problem sets, mastering software languages, and so on. More details about student workload can be found in University Policy S12-3 at http://www.sjsu.edu/senate/docs/S12-3.pdf.

Prerequisite

This course requires understanding of the basic concepts of probability and statistics. Students are therefore expected to have taken Elementary Statistics (ECON3). Introduction to Econometrics (ECON103) is not a prerequisite for this course, but strongly preferred. Prior knowledge of R is not necessary, as it will be taught in the lectures. Time series analysis in economics rests on the mathematical and statistical models. Students should be comfortable with simple algebra and equations.

Course Requirements and Assignments

The course grade will be based on seven quizzes, weekly problem sets, and a final project. The scores are averaged with the following weight:

Assignment	Weight
Problem Sets (2 lowest dropped)	25%
Online Discussion	10%
Quizzes (2 lowest dropped)	50%
Final Project	15%

Quizzes

All quizzes will consist of true/false and multiple-choice questions on…

- concepts
- definitions
- formulas
- data analysis

Students are requested to download the **Canvas Lock Down Browser** on a wireless network enabled device of their choosing (tablet or laptop) that can access Canvas from the classroom, and bring the device to every class session in order to take quizzes and exams. Paper versions of quizzes and exams will be available for students without enabled devices, but exam results may only be reviewed during office hours.

Problem Sets

There are approximately 11 problem sets. The problem sets are intended for students to review and apply materials from the lectures. Each problem set will contain two parts.

The theory part helps students to gain basic understanding of the time series analysis. It is kept at a minimum level but essential for progressing to deeper knowledge of time series. For this part, students are expected to work independently.

The application part asks students to do practical time series analysis using R. For this part, students are expected to work together in a group but hand in their separate copies.

In the application part, you will be asked to. . .

1. enter data;
2. graph data and some key measures;
3. specify a forecasting model with associated statistical hypotheses;
4. estimate a forecasting model;
5. interpret various diagnostics;
6. write an interpretation of the results and answer several questions.

Discussion

Each week, you are expected to post at least one "muddy point" – that is, an unanswered question you have after completing the modules, an issue that you don't fully understand, or something

that you just need clarification on. You will also be asked to respond to at least 2 other students' posts.

Grading Policy

Final grades will be determined as follows:

Assignment	Weight	Dates
Problem Sets (2 lowest dropped)	25%	Weekly
Online Discussion	10%	Weekly
Quizzes (two lowest dropped)	50%	2/6, 2/20, 3/5, 3/19, 4/9, 4/23, 5/7
Final Project	15%	Final exam week

Letter grades will be determined as follows:

A+ = 100-97%	A = 96-93%	A-= 92-90%
B+ = 89-87%	B = 86-83%	B- = 82-80%
C+ = 79-77%	C = 76-73%	C- = 72-70%
D+ = 69-67%	D = 66-63%	D- = 62-60%
F = 59-0% Unsatisfactory		

Late Work Policy

Due dates for every assignment are provided on the course syllabus and course schedule (and posted in Canvas). Unless otherwise stated, assignments are due on those days**. An assignment submitted 24 hours of the due date will only be eligible for 70% of the maximum number of point allotted. Assignments submitted more than 24 hours after the due date will not be accepted.** If you experience extenuating circumstances (e.g., you are hospitalized) that prohibit

you from submitting your assignments on time, please let me know. I will evaluate these instances on a case-by-case basis.

Classroom Protocol

Please try to arrive on time.

In consideration of others, please don't talk during class! And silence phones.

Be sure to notice the specific due dates for assignments.

University Policies

Dropping and Adding

Students are responsible for understanding the policies and procedures about add/drop, grade forgiveness, etc. Refer to the current semester's Catalog Policies section at http://info.sjsu.edu/static/catalog/policies.html. Add/drop deadlines can be found on the current academic year calendars document on the Academic Calendars webpage at http://www.sjsu.edu/provost/services/academic_calendars/. The Late Drop Policy is available at http://www.sjsu.edu/aars/policies/latedrops/policy/**.** Students should be aware of the current deadlines and penalties for dropping classes.

Information about the latest changes and news is available at the Advising Hub at http://www.sjsu.edu/advising/.

Consent for Recording of Class and Public Sharing of Instructor Material

University Policy S12-7, http://www.sjsu.edu/senate/docs/S12-7.pdf, requires students to obtain instructor's permission to record the course.

- "Common courtesy and professional behavior dictate that you notify someone when you are recording him/her. You must obtain the instructor's permission to make audio or video recordings in this class. Such permission allows the recordings to be used for your private, study purposes only. The recordings are the intellectual property of the instructor; you have not been given any rights to reproduce or distribute the material."

- o It is suggested that the greensheet include the instructor's process for granting permission, whether in writing or orally and whether for the whole semester or on a class by class basis.
  - o In classes where active participation of students or guests may be on the recording, permission of those students or guests should be obtained as well.
- "Course material developed by the instructor is the intellectual property of the instructor and cannot be shared publicly without his/her approval. You may not publicly share or upload instructor generated material for this course such as exam questions, lecture notes, or homework solutions without instructor consent."

Academic integrity

Your commitment as a student to learning is evidenced by your enrollment at San Jose State University. The University Academic Integrity Policy S07-2 at http://www.sjsu.edu/senate/docs/S07-2.pdf requires you to be honest in all your academic course work. Faculty members are required to report all infractions to the office of Student Conduct and Ethical Development. The Student Conduct and Ethical Development website is available at http://www.sjsu.edu/studentconduct/.

Instances of academic dishonesty will not be tolerated. Cheating on exams or plagiarism (presenting the work of another as your own, or the use of another person's ideas without giving proper credit) will result in a failing grade and sanctions by the University. For this class, all assignments are to be completed by the individual student unless otherwise specified. If you would like to include your assignment or any material you have submitted, or plan to submit for another class, please note that SJSU's Academic Integrity Policy S07-2 requires approval of instructors.

Campus Policy in Compliance with the American Disabilities Act

If you need course adaptations or accommodations because of a disability, or if you need to make special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible, or see me during office hours. Presidential Directive 97-03 at http://www.sjsu.edu/president/docs/directives/PD_1997-03.pdf requires that students with disabilities requesting accommodations must register with the Accessible Education Center (AEC) at http://www.sjsu.edu/aec to establish a record of their disability.

In 2013, the Disability Resource Center changed its name to be known as the Accessible Education Center, to incorporate a philosophy of accessible education for students with disabilities. The new name change reflects the broad scope of attention and support to SJSU students with disabilities and the University's continued advocacy and commitment to increasing accessibility and inclusivity on campus.

ECON 138 / Business and Economic Forecasting, Spring 2020, Course Schedule

Course Schedule

Week	Date	Topics
1	1/23	Syllabus, introduction, time series data
2	1/28	Introduction to R, statistics basics and review, time series graphs (chp 2)
	1/30	
3	2/4	Simple forecasting methods, data transformation (chp 3)
	2/6	**Quiz 1**
4	2/11	Linear regression models (chp 5)
	2/13	
5	2/18	Linear regression models (chp 5)
	2/20	**Quiz 2**
6	2/25	Time series decomposition (chp 6)
	2/27	
7	3/3	Time series decomposition (chp 6)
	3/5	**Quiz 3**
8	3/10	Exponential Smoothing (chp 7)
	3/12	
9	3/17	AR models (chp 8)
	3/19	**Quiz 4**
10	3/24	
	3/26	MA models
11	3/31	
	4/2	**Spring Recess**
12	4/7	Non-seasonal ARIMA models
	4/9	**Quiz 5**

Week	Date	Topics
13	4/14	
		Forecasting with ARIMA models
	4/16	
14	4/21	Seasonal ARIMA models
	4/23	**Quiz 6**
15	4/28	Forecasting with seasonal ARMA models
	4/30	ARIMA and lag operator
	5/5	ARIMA with regressors
16		
	5/7	**Quiz 7**
17	5/19	Final project due at 2:30 pm