

ECON 5337: Business & Economic Forecasting

Spring 2022

Instructor Information

Instructor(s)

Dr. Christopher Candreva (Feel free to call me Chris, Dr. Candreva, or Prof. Candreva)

Office Number

COB 326

Office Telephone Number

817-272-3061

Email Address

christopher.candreva@uta.edu

Faculty Profile

<https://blog.uta.edu/cob/economics-department/dr-christopher-candreva/>

Personal website: cjwtcandreva.com

Office Hours

Monday 5:30 – 6:30; Wednesday 1:00-2:00; or by appointment.

(for the first three weeks I will have teams office hours Monday from 5:30-6:30)

Course Information

Section Information

ECON 5337 - 002

Time and Place of Class Meetings

Monday/Wednesday 2:30 pm – 3:50 pm in COBA 151

(for the first three weeks these session will take place via teams at their regularly scheduled time.)

Description of Course Content

Catalog Description: The course develops univariate and multivariate methods that allow users to capture patterns in data related to seasonality, trend and other random components to produce forecasts that are useful in virtually any business environment. Students also gain extensive practical experience coding in R and will be able to use statistical tools to critically assess the usefulness of alternative methods. Prerequisite: ECON 5336 or BSAD 6317 or consent of instructor.

Plain English: This is a challenging and extremely useful course that employs statistical techniques in developing forecasts for data that changes with time. The course begins with a description of what a forecast is and the tools necessary to evaluate competing forecasts. Simple methods, including naïve forecasts and forecasts based on exponential smoothing are introduced early. Various forecasting models are introduced, with emphasis placed on modeling the statistical properties of the data under consideration. As the course progresses, the models become more elaborate as we will introduce so-called “ARMA” and “SARIMA” models, forecasts based on regression models, and ultimately, multivariate techniques

Student Learning Outcomes

Upon successful completion of the course, you will be able to do the following:

- You will be able to understand and write code using the programming language R. R is used extensively in industry, such that the course will provide you with an important marketable skill. Every assignment completed in the course will use R.
- You will be able to use statistical tools and intuition to select the most appropriate model amongst a potentially large set of alternatives to use for forecasting purposes.
- You will be able to conduct a forecasting exercise using selected models. Additionally, you will be able to gauge the performance of various forecasting models in predicting time series variables.
- You will be able to present results from your forecasts that could be used to guide decision making.

Required Textbooks and Other Course Materials

Required Book: Hyndman, Rob and George Athanasopoulos (2018): *Forecasting: principles and practice*. Available via URL at: <https://otexts.com/fpp2/> (This is a free open-source textbook).

Recommended Book: Wooldridge, *Introductory Econometrics: A Modern Approach*, 5th edition (This book helps to supplement the time-series regression models we will use as part of this course.) (Currently \$20 on Amazon)

Descriptions of major assignments and examinations

Exams

There will be two exams in this course, one midterm and one comprehensive final. The exams will test both your understanding of the concepts discussed in this course, as well as your ability to apply them. Exams will be open book and open notes, including past homework assignments. Exams will require you to show your understanding of the material through proofs and essays questions, as well as your mastery of its applications through data analysis questions. The proof and essay questions will be provided on an editable word document. Students can either directly edit the document with their answers, or they can print out the exam, write their answers by hand, and then scan their answers and submit it that way. Students are also allowed to use a more powerful word editing program, such as LaTeX if they prefer. For the data analysis questions, students will be given excel sheets containing data and will be asked to answer several questions using this data set. In addition to submitting their answers to these questions, students will also be expected to submit and code, be it STATA, R, Python, SAS, etc... they used to answer these questions. Further information about the formatting and types of exam questions will be provided closer to the exam date. Each exam will be offered over a 24-hour period, starting at 8 am for the day of the exam, closing at 8 am the day after. Students can begin the exam at any time and will be given 3-4 hours (depending on the exam) to complete the exam after it is begun. Exams must be submitted by the closing time, so if you begin your exam at 6 am you will only get until 8 am to finish the exam, regardless of how much time is given. If students are not able to take the exam during the scheduled exam window, they must contact the instructor as soon as possible to schedule an alternative time to take the exam.

Project

Throughout the semester students will work in small groups of 2-3 to conduct a forecasting project and writing a short paper on it. The project involves coming up with a question, acquiring data that address the issue, performing appropriate econometric analysis to address the issue, and writing up the results. Students are free, with instructor consent, to choose any topic of personal interest within their field of study. You can use this project as an opportunity to begin or extend some of your own research. To ensure progression on this project throughout the semester, there are two deadlines of submission for project material. The first is a project proposal. The proposal must contain the primary forecasting goal, and the data to be used for the project for early comment from the instructor. The second is the final draft of your project paper. I anticipate the proposal being 1-3 pages, with the final draft between 10-25 pages, double-spaced. The proposal is due **February 27th**,

and the final draft is due **May 3rd**, both to be submitted via canvas. I accept late work, provided you contact me prior to the assignment due date to explain why it is you need an extension on the assignment. The length of the extension will be determined on a case by case basis. Submitting an assignment shortly after it is due, 12:15-12:30 will not be require contacting me explain the reason it is late, provided it doesn't become a habit. More details will be provided during the semester.

Homework

Throughout the semester there will weekly homework assignments. I expect to assign 12 homework assignments. These assignments will be used to help gauge your understanding of the material ahead of the exams, as well as assist you in learning the material. For this reason, homework will be graded based on effort, not execution. I'm looking for a good faith effort in trying to answer the questions. Half-hearted work, or homework's with answers but no explanation will receive mark downs, in addition to homework's with unanswered questions. Most assignments will require you to use real data sets. These can be found on canvas. More information will be provided when each assignment is assigned. Each homework assignment will be worth 15 points, with the total homework grade category being worth 150 points. Because there will be more than 10 assignments, this means that it is possible to earn 180 homework points. This difference is to account for random life factors that may make it difficult for students to submit one or two homework assignments, as well as provide potential extra credit points. This will be one of two possible sources of extra credit. Homework assignments will be posted to canvas alongside the accompanying video lectures. They will be due the following Sunday at midnight, submitted via canvas. I accept late work, provided you contact me prior to the assignment due date to explain why it is you need an extension on the assignment. The length of the extension will be determined on a case by case basis. Submitting an assignment shortly after it is due, 12:15-12:30 will not be require contacting me explain the reason it is late, provided it doesn't become a habit.

Discussion Board

Research shows that teaching something is one of the best ways to learn it. Additionally, some students are uncomfortable asking questions in class. Therefor I want to give students an opportunity to ask and answer each other's questions outside the normal classroom setting. Both so students have a low-pressure environment to ask questions, and to ensure students have a space to teach each other the material. To do this, we will use a discussion board on Canvas. Each student is expected to post to the discussion board at least twice during the course, with each post earning students 25 points. These posts can either be your own questions or answers to other students' questions. To ensure every student's question receives an answer, I will check the discussion board every weekday and will respond to any unanswered or incorrectly answered questions after 48 hours.

Additionally, to help ensure students continue to use the discussion board throughout the course, additional posts, either questions or answers, after the 2nd will earn students 5 extra credit points. This extra credit is capped at 30 points. This is the other way to earn extra credit in this course. Be sure to check the discussion board multiple time a week to either get your own questions answered or to help address your classmates' concerns.

Technology Requirements

The primary online tool used in this course will be Canvas. Video lectures will be posted to canvas and many meetings/discussions will take place via Microsoft Teams. Students need to ensure they have access to a device that can connect them to canvas. Additionally, students will need access to a statistical package more powerful than excel in order to do the analysis discussed in this course. I will be teaching with R in my lecture videos and in class, and the textbook is written with R in mind. You are free to use STATA, R, SAS, or any other similar program for the assignments in this course. I am personally fluent in STATA and R, so I can provide assistance and feedback with those programs. There are extensive web-based tutorials on the use of EXCEL, STATA, R, and SAS if you need additional assistance. R is a free open-source program that you can download the last version of R [here](#). RStudio is a program that assists with R code organization and visualization. I highly recommend using RStudio if

you wish to use R. Rstudio is available for free [here](#). If you would like to obtain a copy of STATA for your own use, you may order it through the [StataGradPlan](#).

Grading Information

Grading:

Each assignment group will be worth the following number of points:

50	Discussion Board
150	Homework
225	Midterm
50	Project Proposal
200	Final Project
325	Final
1000	Course Grade

Letter grade breakdown based on the number of points earned in the course is as follows:

900 - 1000	A
800 - 899	B
700 - 799	C
600 - 699	D
< 600	F

The instructor reserves the right to lower the thresholds for specific letter grades at their own discretion. These thresholds will never be raised for any reason.

Make-up Exams:

Make-up exams will be offered only in the case of a medical emergency involving the student or a loved one. If a student misses an exam, they will receive a 0 unless they provide a valid excuse as to why they couldn't make the exam. It would be best to present the instructor with your valid excuse ahead of the exam, if possible. If a student misses an exam with a valid excuse for any reason other than the one stated above, the final will instead count for 550 points, taking the place of both exam scores.

Grade Grievances:

Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog. For graduate courses, see <http://catalog.uta.edu/academicregulations/grades/#graduate>. For student complaints, see <http://www.uta.edu/deanofstudents/student-complaints/index.php>.

Course Schedule

Dates	Topics
1/19	Class introduction/Syllabus Review/Introduction to Forecasting (Ch. 1)
1/24	Begin Data Visualizations and Transformations (Ch. 2 -3)
1/26	Finish Data Visualization and Transformation (Ch. 2-3) and Naïve/Mean Forecasts,
1/31	Begin Exponential Smoothing (Ch. 7)
2/2	Finish Exponential Smoothing (Ch. 7)
2/7	Review OLS (Wooldridge Ch. 2-3)
2/9	Time Series Regression Model (Ch. 5.1-5.3, Wooldridge Ch. 10)
2/14	Continue Time Series Regression Model (Ch. 5.1-5.3, Wooldridge Ch.10)
Dates	Topics
2/16	Finish Time Series Regression Model (Ch. 5.1-5.3, Wooldridge Ch.10)
2/21	The White Noise Process

2/23	The Wold Decomposition Theorem
2/28	Introduction to ARIMA (Ch. 8)
3/2	ARIMA Continued (Ch. 8)
3/7	Midterm Review Session
3/9	Midterm Exam
3/14-3/18	Spring Break
3/21	ARIMA with stochastic trends (Ch. 8)
3/23	Begin Unit Roots (Ch. 8, Wooldridge Ch. 12)
3/28	Finish Unit Roots (Ch. 8, Wooldridge Ch. 12)
3/30	Introduction to Seasonal ARIMA (SARIMA) (Ch. 8)
4/4	SARIMA Continued (Ch. 8)
4/6	SARIMA with trending (Ch. 8)
4/11	Begin Dynamic Regression Models (Ch. 9)
4/13	Continue Dynamic Regression Models (Ch. 9)
4/18	Finish Dynamic Regression Models (Ch. 9)
4/20	Begin Vector Autoregression (VAR) (Ch. 11)
4/25	Finish VAR (Ch. 11)
4/27	STL and MSTL Methods (Ch. 11)
5/2	Final Review Session
5/9	Final Exam

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – Dr. Christopher J. W. Candrea

Institutional Information

Drop Policy

Students may [drop or swap](#) (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw.

Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for nonattendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships.

Observance of Religious Holy Days

A student who misses an examination, work assignment or other project because of an observance of a religious holy day will be given the opportunity to complete the work missed within a reasonable time after the absence provided the student has properly notified each instructor. To meet the proper notification requirements, students must notify each instructor in writing of classes scheduled on the dates they will be absent in observance of a religious holy day. **Notification must be made within the first 15 class days** and either personally delivered, acknowledged and dated by the instructor, or sent certified mail, return receipt requested. The student may not be penalized for these excused absences, but the instructor may appropriately respond if the student fails to complete satisfactorily the missed assignment or examination within a reasonable amount of time after the excused absence. A "religious holy day" means a holy day observed by a religion whose places of worship are exempt from property taxation under Section 11.20 of the Tax Code.

<https://www.uta.edu/catalog/2001/general/academicreg.html>

Disability Accommodations

UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA), and Section 504 of the Rehabilitation Act. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: [The Office for Students with Disabilities](#), (OSD) or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at the [OSD website](#).

Non-Discrimination Policy

The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit [Equal Opportunity Services](#).

Title IX Policy

Title IX is a federal law that protects against sex and gender-based discrimination, sexual harassment, sexual assault, sexual misconduct, dating/domestic violence, sexual exploitation and stalking at federally funded educational institutions. UT Arlington is committed to fostering a learning and working environment free from discrimination in all its forms. When sexual misconduct occurs in our community, the university can:

1. Intervene to prevent harmful behavior from continuing or escalating
2. Provide support and remedies to students and employees who have experienced harm or have become involved in a Title IX Investigation
3. Investigate and discipline violations of the university’s relevant policies.

Faculty members and certain staff members are considered “Responsible Employees” or “Mandatory Reporters,” which means that they are required to report violations of Title IX to the Title IX Coordinator. I am a Responsible Employee and must report any Title IX related incidents that are disclosed in writing, discussion, or one-on-one. Before talking with me, or with any faculty or staff member about a Title IX related incident, be sure to ask whether they are a responsible employee. If you want to speak with someone for support or remedies without making an official report to the university. For more information about policies, reporting options and resources, visit the Title IX website: www.uta.edu/titleix or contact the Title IX Coordinator Michelle Willbanks at: titleix@uta.edu.

Academic Integrity

Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code in their courses by having students

acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents' Rule 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University. Additional information is available at [Student Conduct](#). Faculty are encouraged to discuss plagiarism and share the following library tutorials [Copyright & Fair Use: Plagiarism](#) and [Acknowledging Sources](#).

Electronic Communication

UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at [OIT: Student MavMail](#).

Campus Carry

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit [News Center: Campus Carry](#).

Final Review Week

Final Review Week for semester-long courses, a period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Student Feedback Survey

At the end of each term, students enrolled in face-to-face and online classes categorized as "lecture," "seminar," or "laboratory" are directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback via the SFS database is aggregated with that of other students enrolled in the course. Students' anonymity will be protected to the extent that the law allows. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law and aggregate results are posted online. Data from SFS is also used for faculty and program evaluations. For more information, visit [Student Feedback Survey](#).

Active Shooter

The safety and security of our campus is the responsibility of everyone in our community. Each of us has an obligation to be prepared to appropriately respond to threats to our campus, such as an active aggressor. Please review the information provided by UTA Police regarding the options and strategies we can all use to stay safe during difficult situations. For more information, visit [Crime Prevention: Active Shooter](#).

Counseling and Psychological Services (CAPS)

CAPS is available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives. Visit [Counseling and Psychological Services](#) or call 817-272-3671.

Student Support Services

UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include [tutoring](#) by appointment, [drop-in tutoring](#), [mentoring](#) (time management, study skills, etc.), [major-based learning centers](#), [counseling](#), and [federally funded programs](#). For individualized referrals, students may call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at [Resource Hotline](#).

Additional Information

Face Covering Policy

While the use of face coverings on campus is no longer mandatory, all students and instructional staff are strongly encouraged to wear face coverings while they are on campus. This is particularly true inside buildings and within classrooms and labs where social distancing is not possible due to limited space. If a student needs accommodations to ensure social distancing in the classroom due to being at high risk they are encouraged to work directly with the Student Access and Resource Center to assist in these accommodations. If students need masks, they may obtain them at the Central Library, the E.H. Hereford University Center's front desk or in their department.

Attendance

At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator of student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance. However, while UT Arlington does not require instructors to take attendance in their courses, the U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." UT Arlington instructors will report when students begin attendance in a course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report must the last date a student attended their class based on evidence such as a test, participation in a class project or presentation, or an engagement online via Canvas. This date is reported to the Department of Education for federal financial aid recipients.

Emergency Exit Procedures

Should we experience an emergency event that requires evacuation of the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, do not take an elevator but use the stairwells instead. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Academic Success Center

The Academic Success Center (ASC) includes a variety of resources and services to help you maximize your learning and succeed as a student at the University of Texas at Arlington. ASC services include supplemental instruction, peer-led team learning, tutoring, mentoring and TRIO SSS. Academic Success Center services are provided at no additional cost to UTA students. For additional information visit: [Academic Success Center](#). To request disability accommodations for tutoring, please complete this [form](#).

The **IDEAS Center** (<https://www.uta.edu/ideas/>) (2nd Floor of Central Library) offers **FREE** tutoring and mentoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in or check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

The English Writing Center (411LIBR)

The Writing Center offers **FREE** tutoring in 15-, 30-, 45-, and 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Register and make appointments online at the Writing Center (<https://uta.mywconline.com>). Classroom visits, workshops, and specialized services for graduate students and faculty are also available. Please see Writing Center: OWL for detailed information on all our programs and services.

The Library's 2nd floor Academic Plaza (<http://library.uta.edu/academic-plaza>) offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours of operation.

Librarian to Contact

Each academic unit has access to Librarians by Academic Subject that can assist students with research projects, tutorials on plagiarism and citation references as well as support with databases and course reserves.

Help with Canvas:

If you are having issues using canvas, make sure to help button on the bottom of the dashboard on the left-hand side of the screen, or call the Canvas Support Hotline (Student) at 1 (855) 597-3401.

Emergency Phone Numbers

In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911. Non-emergency number 817-272-3381

Library Information

Research or General Library Help

Ask for Help

- [Academic Plaza Consultation Services](http://library.uta.edu/academic-plaza) (library.uta.edu/academic-plaza)
- [Ask Us](http://ask.uta.edu/) (ask.uta.edu/)
- [Research Coaches](http://libguides.uta.edu/researchcoach) (http://libguides.uta.edu/researchcoach)

Resources

- [Library Tutorials](http://library.uta.edu/how-to) (library.uta.edu/how-to)
- [Subject and Course Research Guides](http://libguides.uta.edu) (libguides.uta.edu)
- [Librarians by Subject](http://library.uta.edu/subject-librarians) (library.uta.edu/subject-librarians)
- [A to Z List of Library Databases](http://libguides.uta.edu/az.php) (libguides.uta.edu/az.php)
- [Course Reserves](https://uta.summon.serialssolutions.com/#!/course_reserves) (https://uta.summon.serialssolutions.com/#!/course_reserves)
- [Study Room Reservations](http://openroom.uta.edu/) (openroom.uta.edu/)

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