Instructor: Dr. Aaron Smallwood
Office Location: COBA 327
Phone: (817) 272-3061
Email: smallwood@uta.edu
Course Webpage: All course material can be found on blackboard.

Please check blackboard before each class, as I will frequently post data that we will work with in class. Students are encouraged to bring their laptops to class so that they can follow the examples directly.

Time and Location: M 7:00 - 9:50 pm, Pickard Hall 109.
Office Hours:
   Tuesday 4:30 - 5:30 (p.m.)
   Thursday 12:45 - 1:45

Textbook: The lectures will be based on the following textbook:

Forecasting for economics and business, 1st edition. Author: Gloria Gonzalez-Rivera.

Students will be required to obtain the software R. Preliminary notes have been posted to Blackboard on how to download the software. Assignments will be based on R throughout the course.

Students also have the option of obtaining the very useful software EViews. The student version of the software can be obtained for $39.95 directly from the manufacturer at the following URL:


Course Description and objectives:
This is a challenging and extremely useful course that employs statistical techniques in developing forecasts for business data. The course begins with a description of what a forecast is and the tools necessary to evaluate competing forecasts. 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. Upon successful completion of the course,
1. The student will understand complicated statistical techniques related to modeling business data over time.
2. The student will independently be able to develop a model to forecast business data.
3. The student will be able to compare the relative forecasting ability of various models and choose the most appropriate model among a set of alternatives.
4. The student will gain familiarity with the computer package R and to a less extent EViews and will be able to employ these tools to develop and analyze forecasts.

**Grading: Course grades will be based on the following:**

- Assignments 30%
- Group Project 14%
- Midterm 28%
- Final 28%

I. **Assignments:**
   There will be a total of 3 assignments, which will be administered throughout the course. The assignments will be intensive in both mathematical and computational analysis associated with the techniques developed in this class. Each assignment is worth 10% of your overall grade. Assignments will be administered (and collected) on the following dates:

   a. Assignment #1: Administered: September 13 Due: September 20
   b. Assignment #2: Administered: September 27, Due: October 4.
   c. Assignment #3: Administered: November 8, Due: November 15.

Please note, as we will typically review the assignments at the beginning of class on the dates they are due, I am unable to collect assignments should you be late to class on any of the above dates FOR ANY REASON. If you can not arrive on time or are unable to attend, I will be happy to make arrangements with you to allow you to turn in your assignment before the start of class. Regrettably, students that do not turn in their assignments at the start of class on the dates listed above will receive a zero on that problem set.

To begin assisting you in working with others in the class, one of the assignments can be completed as a group project. I will provide clear instructions on which assignments can be completed with collaboration. Otherwise, working with others on the assignments, in any capacity, is not allowed. Please refer to the statement at the end of the syllabus regarding violations of the University Honor Code.
II. **Group Project:**
By the second month of class, groups of about 5 students will be formed. Each group will select a single series to forecast using all of the methods developed by the end of the semester. Group presentations are scheduled for November 29 or December 6. Additional details on presentations will be given throughout the course.

III. **Exams:**
- Exam 1: Scheduled for October 11, 2016
- Final Exam: December 13, 2016, 8:15-10:45 pm

In the case of a necessitated emergency, properly documented, arrangements will be made to take the exam at a different time. An unexcused absence for an exam will result in a 0% on that exam.

IV. **Participation and attendance**

At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which include establishing course-specific policies on attendance. As the instructor of this section, formally, attendance is not mandatory. You may have been successful in previous courses with intermittent attendance supplemented by reading the textbook. Unfortunately, this course will not lend itself well to that strategy. Due to the technical nature of the course and its difficulty, I don’t anticipate that you will be successful without attending each class period. I understand the complexities that go along with a college schedule, especially for those that have significant responsibilities outside the classroom. However, if you feel that you may miss class even just on rare occasions, then I suspect you will find yourself struggling accordingly. Please feel free to discuss any specific concerns you may have.

**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 non-attendance.** 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 (http://wweb.uta.edu/aao/fao/).
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) www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also 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.

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 uta.edu/eos.

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Jean Hood, Vice President and Title IX Coordinator at (817) 272-7091 or jmhood@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 https://www.uta.edu/conduct/.

**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 http://www.uta.edu/oit/cs/email/mavmail.php.

**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 http://www.uta.edu/news/info/campus-carry/.

**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 http://www.uta.edu/sfs.

**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.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

**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, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view at [http://www.uta.edu/universitycollege/resources/index.php](http://www.uta.edu/universitycollege/resources/index.php).
**Preliminary Outline**

**Week 1 (Aug. 30):** Distribute syllabi. Meet students. Introduction. Elements of forecasting: The decision environment and loss function. The forecast object, forecast statement, forecast horizon, the information set, and methodology (chapter 1 and 4).

**Week 2 (Sept 6):** Reviewing the linear regression model and introduction to R and EViews. Definition of useful statistics. Concept of stationarity introduced (chapter 2).


**Week 4 (Sept 20):** Problem set #1 due. Statistical characteristics of data we wish to observe: Mean of the data, covariance of the data, indirect correlation of the data over time, and direct correlation of the data over time. The building block of all forecasting models: the white noise process. How do we know if a model actually exists, which can be applied to our data? The Wold decomposition theorem. Introduction to the Box-Jenkins methodology (chapter 3).

**Week 5 (Sept 27):** Problem set #1 returned and reviewed. Theoretical characteristics of MA processes and forecasting moving average processes. Introduction to AR processes (chapter 6). Problem set #2 administered.

**Week 6 (October 4):** Problem set #2 due. Properties of AR processes. Forecasting autoregressive processes: The chain rule of forecasting. (chapter 6,7,8).

**Week 7: (October 11):** Exam #1.

**Week 8 (October 18):** Return and review exam #1. Forecasting in practice. Residual autocorrelations and tests for no serial correlation. (chapter 8).

**Week 9 (October 25):** Theoretical characteristics of ARMA(p,q) processes. Forecasting ARMA processes. (chapter 8)

**Week 10 (November 1):** Working with ARMA processes and forecasting concluded. Dealing with seasonality. Deterministic seasonality. Introduction to stochastic seasonality and SARIMA models (chapter 7,8).

**Week 11 (November 8):** Stochastic seasonality continued. Forecasting data with seasonal characteristics. (chapter 7,8). Problem set #3 administered.

**Week 12 (November 15):** Problem set #3 due. Seasonality concluded. Dealing with trending data. Deterministic trends. (chapter 7,8,10).


**Week 14 (November 29):** Group presentations. Forecasting trending data concluded. Introduction to forecasting for a system (chapter 10-11). Review for final exam (chapter 11).

**Week 15 (December 6):** Group presentations. Vector autoregressions. Forecasting with VAR/VECM models.

**December 13, FINAL EXAM.**