**STA 5346.001 Course Syllabus**  
2023 / Fall  
**Applied Time Series**

**Instructor:** Jacob Turner, Ph.D.  
**Department:** Mathematics and Statistics  
**Email:** turnerja2@sfasu.edu  
**Phone:** 936-468-1692  
**Office:** 342 NM  
**Office Hours:**

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<tr>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
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<td>11am-12:30pm</td>
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Or by appointment

**Class meeting time and place:** MWF 9am - 9:50am, Mathematics 358

**Text and Materials:**

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<tr>
<td>R statistical software</td>
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**Course Details:**

**Course Objectives:**
The main objective of this course is to develop skills and the necessary knowledge of handling time series data. The course aims to provide the foundational underpinnings of how time series data is different from other types of regression models, key diagnostic tools, models for stationary time series, model determination, addressing seasonality, and signal plus noise models. Time permitting, we will also cover logistics of implementing multiple linear regression strategies with time series as well as deep neural network time series models.

**Course outline**

**Course Topics:**

- Chapters 1 & 2
  - The tsgwe package in R
  - Key Definitions
  - Centered Moving Average Smoothers
  - Decomposing Seasonal data
- Chapters 3 & 4
  - Realizations
  - Stationary time series
  - ACF and PACF plots
  - Estimating the mean of a stationary time series
  - Spectral density and filtering
- Chapter 5
  - AR models (1, 2, and p)
  - Operator Notation and Characteristic Equations
  - Factor tables
  - General Linear Process

**Approximate time spent**

- Chapters 1 & 2: 1 week
- Chapters 3 & 4: 2 weeks
- Chapter 5: 4 weeks
Moving Averages (1,2, and q)
○ ARMA

• Chapter 6 & 7
  ○ ARMA fitting and forecasting
  ○ ARIMA
  ○ Arch/Garch models

• Chapter 8 & 9
  ○ Time Series Regression
  ○ Line + Noise
  ○ Cos + Noise
  ○ Model assessment

• Additional Topics
  ○ Ch 10 MLR/VAR
  ○ Ch 11 Network Based Models

Grading and Assignment Descriptions

Your grade will be determined in terms of two categorical assignments

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<th>D</th>
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<tr>
<td>Daily HW</td>
<td>60% or more complete</td>
<td>70% or more complete</td>
<td>80% or more complete</td>
<td>90% or more complete</td>
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<tr>
<td>Weekly HW</td>
<td>60% or more complete</td>
<td>70% or more complete</td>
<td>80% or more complete</td>
<td>90% or more complete</td>
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If you are not able to meet the criteria of the D grade, then your grade will be an F. Your grade is determined by the lowest category you have achieved for the semester. If you have an A in the first category but a C in the second category, your grade for the semester will be a C.

Daily HW is either complete or incomplete. These assignments are about you keeping up with the things necessary to be a participant in class. Dailys will be due before the beginning of the next class. Occasionally we will conduct our daily assignment within the class itself. I will let you know when these cases arise.

Weekly assignments will be distributed in multiple ways throughout the course. Some weeklys will be group assignments that will end in a presentation or write up. Others will be traditional HW assignments. Weekly HW will be graded as either complete or incomplete. Tentatively, we will have a brief time after submission where you can resubmit if you did not receive a complete. Once you get comfortable with how I grade these assignments, the plan will be to remove the resubmission process. If I feel that resubmissions are necessary then we will continue throughout the term in this way. Group assignments cannot be resubmitted.

Per SFA policy 5.4, the schedule should reflect that there is (1) an amount of student work per credit hour that reasonably approximates not less than one hour of class or direct faculty instruction and two hours of out-of-class student work per week for fifteen weeks over a long semester, or the equivalent amount of work over a different amount of time; or (2) at least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours. So, for instance, a 3 credit hour face-to-face course in the fall or spring term should approximate 150 minutes of classroom time and at least 6 hours of out-of-class work per week for fifteen weeks.

Academic Integrity
The Code of Student Conduct and Academic Integrity outlines the prohibited conduct by any student enrolled in a course at SFA. It is the responsibility of all members of all faculty, staff, and students to adhere to and uphold this policy.
Articles IV, VI, and VII of the new Code of Student Conduct and Academic Integrity outline the violations and procedures concerning academic conduct, including cheating, plagiarism, collusion, and misrepresentation. Cheating includes, but is not limited to: (1) Copying from the test paper (or other assignment) of another student, (2) Possession and/or use during a test of materials that are not authorized by the person giving the test, (3) Using, obtaining, or attempting to obtain by any means the whole or any part of a non-administered test, test key, homework solution, or computer program, or using a test that has been administered in prior classes or semesters without permission of the Faculty member, (4) Substituting for another person, or permitting another person to substitute for one’s self, to take a test, (5) Falsifying research data, laboratory reports, and/or other records or academic work offered for credit, (6) Using any sort of unauthorized resources or technology in completion of educational activities.

Plagiarism is the appropriation of material that is attributable in whole or in part to another source or the use of one’s own previous work in another context without citing that it was used previously, without any indication of the original source, including words, ideas, illustrations, structure, computer code, and other expression or media, and presenting that material as one’s own academic work being offered for credit or in conjunction with a program course or degree requirements.

Collusion is the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on academic dishonesty, including disclosing and/or distributing the contents of an exam.

Misrepresentation is providing false grades or résumés; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual or to injure another student academically or financially.

Withheld Grades Semester Grades (SFA Policy 5.5)
Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the coursework because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course to compute the grade point average. For additional information, go to https://www.sfasu.edu/policies/course-grades-5.5.pdf.

Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices.

SFASU Mental Health Statement: SFASU values students’ mental health and the role it plays in academic and overall student success. SFA provides a variety of resources to support students mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:
SFASU Counseling Services
www.sfasu.edu/counselingservices
3rd Floor Rusk Building
936-468-2401

SFASU Human Services Counseling Clinic
www.sfasu.edu/humanservices/139.asp
Human Services Room 202
936-468-1041

Crisis Resources:
Acceptable Student Behavior
Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy 10.4). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.
The following is an excerpt from SFA Policy 5.4:

The federal definition of a credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates:

1. Not less than one hour of classroom or direct faculty instruction and a minimum of two hours out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time, or;

2. At least an equivalent amount of work as outlined in item 1 above for other academic activities as established by the institution including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

To this end, all students in courses offered by the Department of Mathematics and Statistics that wish to be successful should plan to spend a minimum of two hours outside of class for every credit hour associated with this course. Expected activities to be completed in the time outside of class include reviewing notes from previous class meetings, reading assigned course resources, completing all assigned exercises and projects, and performing periodic assessment preparation.

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Plagiarism is the appropriation of material that is attributable in whole or in part to another source or the use of one’s own previous work in another context without citing that it was used previously, without any indication of the original source, including words, ideas, illustrations, structure, computer code, and other expression or media, and presenting that material as one’s own academic work being offered for credit or in conjunction with a program course or degree requirements.

Collusion is the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any provision of the rules on academic dishonesty, including disclosing and/or distributing the contents of an exam.

Misrepresentation is providing false grades or résumés; providing false or misleading information in an effort to receive a postponement or an extension on a test, quiz, or other assignment for the purpose of obtaining an academic or financial benefit for oneself or another individual or to injure another student academically or financially.

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To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices.

Student Wellness and Well-Being
SFA values students’ overall well-being, mental health and the role it plays in academic and overall student success. Students may experience stressors that can impact both their academic experience and their personal well-being. These may include academic pressure and challenges associated with relationships, emotional well-being, alcohol and other drugs, identities, finances, etc.

If you are experiencing concerns, seeking help, SFA provides a variety of resources to support students’ mental health and wellness. Many of these resources are free, and all of them are confidential.

On-campus Resources:
The Dean of Students Office (Rusk Building, 3rd floor lobby)
www.sfasu.edu/deanofstudents
936.468.7249
dos@sfasu.edu

SFA Human Services Counseling Clinic Human Services, Room 202
www.sfasu.edu/humanservices/139.asp
936.468.1041

The Health and Wellness Hub “The Hub” Location: corner of E. College and Raguet St.

To support the health and well-being of every Lumberjack, the Health and Wellness Hub offers comprehensive services that treat the whole person – mind, body and spirit. Services include:

- Health Services
- Counseling Services
- Student Outreach and Support
- Food Pantry
- Wellness Coaching
- Alcohol and Other Drug Education

www.sfasu.edu/thehub
936.468.4008
thehub@sfasu.edu

Crisis Resources:
- Burke 24-hour crisis line: 1.800.392.8343
- National Suicide Crisis Prevention: 9-8-8
- Suicide Prevention Lifeline: 1.800.273.TALK (8255)
- Crisis Text Line: Text HELLO to 741-741

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Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy 10.4). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom.

Date of document: 08/23/2023