KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS & STATISTICS
STAT 523 - Forecasting
Term 232 Syllabus

Instructor: Dr. Mohammad H. Omar   **Office:** Bldg. 5-508.
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Office Hours: UR: (11.00-11.45am in bldg 24 room 149) and T (5.50pm-6.35 in b59 rm 1007) or by appointment

Course Description: Time Series Basics; Autocorrelation; Modeling and forecasting with MA, AR, ARMA, ARIMA models; Seasonal and non-seasonal models; Model validation; Parameter selection; Smoothing and decomposition methods; Advanced forecasting methods, Multivariate models, State Space Models, Arch and Garch Models; projects using various software, toolboxes, and libraries like R, Scikit-Learn, and Statsmodels.

Prerequisite: STAT 503

Textbooks: 1) Cryer, J. D. and Chan, K. (2009). Time Series Analysis with Applications in *R*, 2nd Edition, Springer, New York, USA.

2) Diebold, F. X. (2007). Elements of Forecasting. 4th Edition, Thomson, South-Western, Mason OH, USA.
References: handouts

Software: Main: *R* statistical language. Students are required to download *R* onto their laptop computers for assignments and practice. Instructions for downloading this free software is available on oneNote.
Also: Python's Statsmodels and SciKit-Learn.

Assessment
Assessment for this course will be based on homework and/or quizzes, term project, two major exams and a comprehensive final exam, as in the following:

Activity	Weight
Classwork (Participation, Quizzes, and Assignments)	15%
Term Paper Project **Tuesday (week 11)**	20%
MidTerm Exam (topics 1 through 3) **Tuesday (Feb 27– week 7), 6.45pm – 8.45pm**	30%
Final Exam (Comprehensive) **As announced by Registrar**	35%

IMPORTANT NOTE on GRADES: There is no quota on the number of students who can get an A+ grade.
✓ *Attendance* on time is *very* important. Mostly, attendance will be checked within the *first five minutes* of the class. Entering the class after that, is considered as late (**2 lates= 1 Absence**) and
✓ **More than 10 minutes late = Absence** (regardless of any excuse).
Academic Integrity: All KFUPM policies regarding ethics and academic honesty apply to this course.

Attendance: Students are expected to attend all lectures.
➢ If a student misses a class, he/she is responsible for any announcement made in that class.
➢ After warned **twice** by the instructor, a DN grade will be awarded to any student who accumulates
     • 6 unexcused absences in lectures. (20%)

- 10 excused and unexcused absences in lectures. (33.3%)

The Usage of Mobiles in Class: Students are **not allowed** to use mobiles for any purpose during class time. Students who want to use electronic devices to take notes **must take permission** from their instructor. Violations of these rules will result in a **penalty** decided by the instructor.

Important Notes:
- ✓ Excessive absences will result in a grade of DN in accordance with University rules as described above.
- ✓ Attendance on time is very important.
- ✓ Homework is due in class every Sunday a chapter is completely covered.
- ✓ A class quiz is often given at the end of the following week a chapter is completely covered.
- ✓ A formula sheet (check OneNote) and statistical tables will be provided for you in every exam.

Tentative weekly topical breakdown

week	start	end	topic	Diebold	CryerChan
1	14-Jan	16-Jan	Time Series Basics	Ch1: p.1-13	1.1 to 1.2
2	21-Jan	23-Jan	Autocorrelation		Ch 2
3	28-Jan	30-Jan	Modeling and forecasting with MA, AR, ARMA, ARIMA		Ch 4 & 5
4	4-Feb	6-Feb	(Continue) Forecasting with MA, AR, ARMA, ARIMA	Ch9	9.1,9.3-9.9
			Term paper data and topic due		
5	11-Feb	13-Feb	Seasonal and non-seasonal models;		Ch10
6	18-Feb	20-Feb	Seasonal and non-seasonal models; (Continue)		
7	25-Feb	27-Feb	Model validation		Ch 8
8	3-Mar	5-Mar	Parameter selection		Ch 7
9	10-Mar	12-Mar	Parameter selection (Continue)		
10	17-Mar	19-Mar	Smoothing and decomposition methods	Ch10	
11	24-Mar	26-Mar	Multivariate models	Handout	
			Term paper due		
12	21-Apr	23-Apr	ARCH and GARCH Models		Ch 12
13	28-Apr	30-Apr	ARCH and GARCH (Continue)	Ch 14	
14	5-May	7-May	State Space Models	Handout	
15	12-May	14-May	State Space Models (Continue)		

Some tips to enhance your problem-solving skills:
- ❖ Do all homework assignments on time.
- ❖ Practice (but not memorize) more problems than those given in the above list.
- ❖ Solve some review exercises available at the end of each chapter.
- ❖ Solve the problems on your own before reading the solution or asking for help.
- ❖ If you find it difficult to handle a certain type of problems, you should try more problems of the same type.
- ❖ Try to make good use of the office hours of your instructor. Always bring your solution trials to discuss them with your instructor.