SYLLABUS FOR GRADUATE COURSES
Student Copy

A. COURSE INFORMATION

COURSE NUMBER	MATH 271.2			NO. OF UNITS	3
COURSE TITLE	Advanced Statistical Methods				
PREREQUISITE/S	MATH 40.1, MATH 62.2				
DEPARTMENT/ PROGRAM	Mathematics			SCHOOL	SOSE
SCHOOL YEAR	2024 – 2025			SEMESTER	Intersession
INSTRUCTOR/S	Jeric C. Briones				
VENUE	SEC-A304A	SECTION	E F	SCHEDULE	D 14:00 – 15:30 D 15:30 – 17:00

B. COURSE DESCRIPTION

The course is the continuation of Time Series Analysis for applied math majors. It discusses topics such as ARIMA, seasonal ARIMA, heteroscedastic models, and time series regression. It also analyzes some financial time series data to illustrate key concepts and methods.

C. COURSE LEARNING OUTCOMES

By the end of this course, students should be able to:

COURSE LEARNING OUTCOMES
CLO1: Describe and compute important features of integrated processes, including coefficients of fitted non-seasonal and seasonal ARIMA models, and forecasts based on the fitted model.
CLO2: Describe and compute important features of volatility, including coefficients of fitted GARCH models.
CLO3: Identify appropriate algorithms for time series model fitting and forecasting, and correctly implement them using relevant statistical software.
CLO4: Recognize that time series models are essential tools in analyzing important phenomena in finance and other related fields.

D. COURSE OUTLINE AND LEARNING HOURS

COURSE OUTLINE	CLO	ESTIMATED LEARNING HOURS

Module 1: Linear Time Series Models
    ARMA and ARIMA Models
    Seasonal Models
 	
LONG TEST 1 – JUNE 28*
	1, 3, 4	36

Module 2: Volatility Models
    ARCH Models
    GARCH Models
 	
LONG TEST 2 – JULY 17*
	2, 3, 4	30

Module 3: Multivariate Time Series
    Mean Equations
    Co-integration
    Volatility Models
	1, 2, 3, 4	9

DATA ANALYSIS PROJECT – JULY 11 TO 12*	1, 2, 3, 4	15

*These dates are tentative. If there are changes, there will be an announcement.

E. ASSESSMENT AND RUBRICS

ASSESSMENT TASKS	ASSESSMENT WEIGHT	CLO
Long Test 1*	35%	1, 3
Long Test 2*	35%	2, 3
Data Analysis Project	30%	1, 2, 3, 4

*Quizzes and problem sets may be given as an assessment of the student's understanding of the topic and as a supplement to class discussions. Grades for quizzes and problem sets will be counted towards the corresponding long test.

F. TEACHING AND LEARNING METHODS

TEACHING & LEARNING METHODS & ACTIVITIES	CLO
Lectures	1, 2, 3, 4
Guided-Paced Study, Handouts, Reading Assignments	1, 2, 3, 4
Problem Solving Sessions	1, 2
Computer Sessions	3
Group Project	1, 2, 3, 4

G. REQUIRED READINGS

[RR1] R. Shumway and D. Stoffer. *Time Series Analysis and Its Applications: With R Examples*. Springer, 4th edition, 2017.

[RR2] R. Tsay. *An Introduction to Analysis of Financial Data with R*. John Wiley & Sons, 2014.

H. SUGGESTED READINGS

[SR1] P. Brockwell and R. Davis. *Introduction to Time Series and Forecasting*. Springer, 3rd edition, 2016.

[SR2] C. Chatfield and H. Xing. *The Analysis of Time Series: An Introduction with R*. CRC Press, 2019.

[SR3] G. James, D. Witten, T. Hastie, and R. Tibshirani. *An Introduction to Statistical Learning (with Applications in R)*. Springer, 2nd edition, 2021.

[SR4] R. Krispin. *Hands-On Time Series Analysis with R: Perform Time Series Analysis and Forecasting Using R*. Packt Publishing Ltd, 2019.

[SR5] D. Montgomery, C. Jennings, and M. Kulahci. *Introduction to Time Series Analysis and Forecasting*. John Wiley & Sons, 2015.

[SR6] A. Nielsen. *Practical Time Series Analysis: Prediction with Statistics and Machine Learning*. O'Reilly Media, 2019.

[SR7] A. Pal and P. Prakash. *Practical Time Series Analysis: Master Time Series Data Processing, Visualization, and Modeling Using python*. Packt Publishing Ltd, 2017.

[SR8] M. Paolella. *Linear Models and Time-Series Analysis: Regression, ANOVA, ARMA and GARCH*. John Wiley & Sons, 2018.

[SR9] R. Shumway and D. Stoffer. *Time Series: A Data Analysis Approach using R*. CRC Press, 2019.

[SR10] W. Woodward, H. Gray, and A. Elliott. *Applied Time Series Analysis with R*. CRC Press, 2017.

I. GRADING SYSTEM

PERCENTAGE OF FINAL GRADE	EQUIVALENT LETTER GRADE	NUMERICAL EQUIVALENT
$92\% - 100\%$	A	4.00
$85\% - 91\%$	A-	3.67
$73\% - 84\%$	B+	3.33
$60\% - 72\%$	B	3.00
$50\% - 59\%$	C	2.00
Below 50%	F	0.00

A grade of C or F does not entitle the student to any graduate credit for the course. This implies that the student must retake the course should he/she obtain such grade.

J. CLASS POLICIES

1. The official learning management system for this course will be Canvas. Only students who are officially enrolled will be included in the Canvas class and will be allowed to take and submit graded assessments. Students who join the course in Canvas but whose names do not appear in the official class list provided by the Registrar will be removed as a student in the Canvas course. Students who require support for Canvas may seek help by sending an email to `ls.one@ateneo.edu` or chatting with LS-One through that account using their official student email.

2. The learning mode for this class is **onsite**, with classes to be held in **SEC-A304A** by default, or online when necessary. Recordings and other materials used in synchronous sessions will be uploaded online, with the link to be posted in Canvas. *Should the need arise or should circumstances change, the learning mode for this class will shift to online.*

3. Materials posted on the course sites (Canvas, OneDrive, etc.) must not be shared online (on any other platform, website, and social media) or offline, and with other students not enrolled in the course. Infringements will result in disciplinary actions (e.g., reprimand, a zero in that graded assessment).

4. All exams will be taken onsite, unless otherwise stated. For all course assessments, use clean/recycled A4 bond papers, and **do not write or print at the back**. For written assessments, use only black or blue

ball pens, and **only one item per page**. Paper submissions are expected to follow the specified LATEX template. Relevant computation files, if any, must be sent to the instructor following the instructions given. Late submissions will not be accepted.

5. Make-up assessments may be given in the case of grave medical and familial reasons (e.g., COVID-related, debilitating illness, death in the family) or official representation of the school (e.g., athletic events and other competitions, as endorsed by appropriate offices), after submission of a signed excuse letter at most **seven academic calendar days** after the assessment was given. The excuse letter should be handwritten on a clean sheet of paper, signed by the student, and certified true by a parent or guardian, with the scanned copy sent by email to the instructor. The contact information of the parent/guardian must be written down in the letter explicitly. *Commitments to attend events like weddings and birthdays or to travel are not considered valid reasons to secure a make-up exam.*

6. Students are highly encouraged to have a scientific calculator at their disposal during discussions, and have ready access to programs that will be used in this course.

7. Penalties (e.g., a zero in that graded assessment) will be imposed on submissions that are either not compliant to the guidelines set by the instructor or completed after the deadline.

8. Students are given at most three (3) school days after the return of the assessment to make the necessary appeals and requests for corrections. After the said period, grade changes will no longer be entertained. The instructor reserves the right to review the entirety of the assessment, not just the item/part requested to be regraded. Note that this may result to an increase or decrease in the total score. All change-of-grade decisions are final.

9. All communications with the instructors should be coursed through email or Canvas. Outside of these channels, students should consult first with the instructor before using them. Students can contact the instructor at any time, but replies should only be expected during office hours.

10. When using AI tools (such as ChatGPT) for submissions, students are expected to (1) acknowledge and cite their use appropriately; (2) verify the accuracy of their content; and (3) take ownership of their submission. Submissions must also include an appendix detailing how and where these tools were used, including prompts used and output screenshots. Additional guidelines may be provided later.

11. Students are expected to exercise the highest level of academic integrity. Cheating or plagiarism will not be tolerated and will be treated as a grave offense (automatic F in the course). Disciplinary action will be pursued, following the process set by the university. Cheating during any graded activity includes, but is not limited to, posting of answers or hints related to any graded work in any online (e.g., social networking sites, chats) or offline (e.g., text messages) platform. Plagiarism also includes using AI tools without proper acknowledgement and citation.

12. The overall grade reflected in the Canvas course is not the official grade of the student. The official grade of the student in the course is the grade that is posted by the Registrar and reflected in the student's AISIS account.

13. The class adheres to the policies on attendance set forth in the Graduate Student Handbook.

14. The class also adheres to the HE Gender Policy, and the Code of Decorum and Administrative Rules on Sexual Harassment, Other Forms of Sexual Misconduct, and Inappropriate Behavior.

15. Other important guidelines and class policies not stated in this syllabus will be posted in Canvas.

K. CONSULTATION HOURS

NAME OF FACULTY	EMAIL	DAYS	TIME
Jeric C. Briones	jbriones@ateneo.edu	D *by appointment*	13:00 - 14:00 SEC-A321

L. ADDITIONAL NOTES

Important Dates   (***Subject to changes***. *Updated dates will be posted in the course site*)

DATE	DAY	ACTIVITY
Jun 5	Wed	Start of Intersession
Jun 5 – 25	Wed – Tue	Module 1 Topics
Jun 12	*Wed*	*Independence Day*
Jun 17*	*Mon*	*Eid al-Adha*
Jun 18	*Tue*	*SOSE Graduation Practice*
Jun 21	*Fri*	*SOSE Graduation*
Jun 26 – Jul 5	Wed – Fri	Module 2 Topics
Jun 28*	Fri	Long Test 1
Jul 8 – 10	Mon – Wed	Module 3 Topics
Jul 11 – 12*	Thu – Fri	Data Analysis Project Presentations
Jul 16	*Tue*	*Study Day*
Jul 17 – 20	Wed - Sat	Finals Week
Jul 17*	Wed	Long Test 2
Jul 20*	Sat	DUE: Data Analysis Project Paper

Onsite classes will be held on the **first session (June 5)** of the term, and every session thereafter. Changes in synchronous and asynchronous sessions will be announced at least 24 hours in advance.

Useful Links

1. For general information about our virtual campus: `https://ateneobluecloud.ateneo.edu/`
2. The One Stop Student Services for LS: `https://sites.google.com/ateneo.edu/ls-one` or alternatively, you may use `bit.ly/LS-One`.
3. The LS Primer, CHARTING A RE-IMAGINED PATH: ADAPTIVE TEACHING AND LEARNING IN THE LOYOLA SCHOOL, SY 2020-2021, `https://ateneobluecloud.ateneo.edu/LS`.