

Department of: Statistics & Informatics

College of: Administration and Economics.

University of: Salahaddin-Hawler.

Subject: Time Series

Course Book: MSc. Stage

*First Semester*

Lecturer's name: Prof. Dr Taha Hussein Ali

Academic Year: 2023 - 2024

**Course Book**

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| 1. Course name | Time Series |
| 2. Lecturer in charge | Dr Taha Hussein Ali |
| 3. Department/ College | Department of Statistics and Informative / College of Administration and Economics. |
| 4. Contact | e-mail: **taha.ali@su.edu.krd** |
| 5. Time (in hours) per week  | Theory: 2 hours and Practical: 1  |
| 6. Office hours | 15 hours per week |
| 7. Course code |  |
| 8. Teacher's academic profile | Ali, Taha Hussein is a professor of Applied Statistics at the University of Salahaddin. His research interests include Quality Control Charts, Robust Methods, Bayesian Approach, and Linear Models. He has published over 40 papers in prestigious journals, three books in Statistics, and received several awards for his work. He enjoys hiking and playing chess in his spare time. |
| 10. Course overview: Time series analysis refers to problems in which observations are collected at regular time intervals and there are correlations among successive observations. Applications cover virtually all areas of Statistics but some of the most important include economic and financial time series and many areas of environmental or ecological data. |
| 11. Course objective:In this course, I shall cover some of the most important methods for dealing with these problems. In the case of time series, these include the basic definitions of autocorrelations etc., then time-domain model fitting including autoregressive and moving average processes, spectral methods, and some discussion of the effect of time series correlations on other kinds of statistical inference, such as the estimation of means and regression coefficients. |
| 12. Student's obligationA student has an obligation to exhibit honesty and to respect the ethical standards of the profession in carrying out his or her academic assignments. Without limiting the application of this principle, a student may be found to have violated this obligation if he or she: (see [note](http://www.pitt.edu/~provost/ainote2.html) concerning more appropriate invocation of University of Pittsburgh Student Code of Conduct and Judicial Procedures) 1. Refers during an academic evaluation to materials or sources, or employs devices, not authorized by the faculty member.2. Provides assistance during an academic evaluation to another person in a manner not authorized by the faculty member.3. Receives assistance during an academic evaluation from another person in a manner not authorized by the faculty member.4. Engages in unauthorized possession, buying, selling, obtaining, or use of any materials intended to be used as an instrument of academic evaluation in advance of its administration.5. Acts as a substitute for another person in any academic evaluation process.6. Utilizes a substitute in any academic evaluation proceeding.7. Practices any form of deceit in an academic evaluation proceeding.8. Depends on the aid of others in a manner expressly prohibited by the faculty member, in the research, preparation, creation, writing, performing, or publication of work to be submitted for academic credit or evaluation.9. Provides aid to another person, knowing such aid is expressly prohibited by the instructor, in the research, preparation, creation, writing, performing, or publication of work to be submitted for academic credit or evaluation.10. Presents as one's own, for academic evaluation, the ideas, representations, or words of another person or persons without customary and proper acknowledgement of sources. |
| 13. Forms of teachingDifferent forms of teaching will be used to reach the objectives of the course: PowerPoint presentations for the head titles and summary of conclusion, classification of material and any other illustrations. There will be classroom discussions and the lecture will give enough background to translate, solve, and analyse. |
| 14. Assessment schemeThe student must be examined twice in each course. The last grade is (30). Putting grades for daily activities, and homework, for (20) marks.The annual work of the material (40) marks.The final exam is out of (50) marks.The grades of the annual work and the final exam will be out of (100) marks and the student will be successful if he gets (50) or more.) |
| 15. Student learning outcome: Student learning outcomes statements clearly state the expected knowledge, skills, attitudes, competencies, and habits of mind that students are expected to acquire at an institution of higher education. Transparent student learning outcomes statements are:• Specific to the institutional level and/or program level •Clearly expressed and understandable by multiple audiences •Prominently posted at or linked to multiple places across the website •Updated regularly to reflect current outcomes •Receptive to feedback or comments on the quality and utility of the information provided  |
| 16. Course Reading List and References‌:1. Ali, Taha Hussein, Saman Hussein Mahmood, and Awat Sirdar Wahdi. "Using Proposed Hybrid method for neural networks and wavelet to estimate time series model." Tikrit Journal of Administration and Economics Sciences 18.57 part 3 (2022).
2. Shahla Hani Ali, Heyam A.A.Hayawi, Nazeera Sedeek K., and Taha Hussein Ali, (2023) "Predicting the Consumer price index and inflation average for the Kurdistan Region of Iraq using a dynamic model of neural networks with time series", The 7th International Conference of Union if Arab Statistician-Cairo, Egypt 8-9/3/2023:137-147.
3. Ali, Taha Hussein and Jwana Rostam Qadir. "Using Wavelet Shrinkage in the Cox Proportional Hazards Regression model (simulation study)", Iraqi Journal of Statistical Sciences, 19, 1, 2022, 17-29.
4. Ali, Taha Hussein & Qais Mustafa. "Reducing the orders of mixed model (ARMA) before and after the wavelet de-noising with application." Journal of Humanity Sciences 20.6 (2016): 433-442.
5. Ali, Taha Hussein & Mardin Samir Ali. "Analysis of Some Linear Dynamic Systems with Bivariate Wavelets" Iraqi Journal of Statistical Sciences 16.3 (2019): 85-109.
6. P.J. Brockwell and R.A. Davis, Time Series: Theory and Methods, Springer Series in Statistics (1986).
7. C. Chatfield, The Analysis of Time Series: Theory and Practice, Chapman and Hall (1975). Good general introduction, especially for those completely new to time series.
8. P.J. Diggle, Time Series: A Biostatistical Introduction, Oxford University Press (1990).
9. M. Kendall, Time Series, Charles Griffin (1976).
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| 17. The Topics: | Lecturer's name: |
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|  | Subject |
| First week  | * Models for time series
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| Second week | * Trend, seasonality, cycles and residuals
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| Third week | * Stationary processes
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| Fourth week | * Autoregressive processes
 |
| Fifth week | * Moving average processes
 |
| Sixth week | * White noise
* The turning point test
 |
| Seventh week  | ➢ Models of stationary processes |
| Eighth week  | * ARMA processes
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| Ninth week  | * ARIMA processes
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| Tenth week  | * Estimation of the autocovariance function
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| Eleventh week  | * Identifying a MA(q) process
* Identifying an AR(p) process
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| Twelfth week | * Distributions of the ACF and PACF
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| Thirteenth week  | * Estimation of the spectrum
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| Fourteenth week | * Distribution of spectral estimates
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| Fifteenth week  | * Estimation of trend and seasonality
* Exponential smoothing
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 | Dr Taha Hussein AliThree hours a weekex: 15/10/2023 |
| 18. Practical Topics (If there is any) |  |
| In this section, the lecturer shall write titles of all practical topics he/she is going to give during the term. This also includes a brief description of the objectives of each topic and the date and time of the lecture. |  |