



School	Business
Department	Economics, Business & Finance
Module title	Advanced Econometrics
Module Code	2104308
Credit hours:	3 Credit Hours
Module Leader	Huthaifa Alqaralleh (huthaifa89@mutah.edu.jo)

This course discusses how to deal with time series data taking into account their frequencies, with a focus on the empirical side through real data at both macro, micro and financial data. Students will also have the opportunity to use time series models in forecasting. Next, we will upgrade to modern models that include machine learning models and how to use them in the context of time series.

The focus of the course will be applied, rather than theoretical, with the aim at improving students' skills in using different statistical packages such as R, Stata, and others.

On completion of this module, students should:

- Correctly download, clean, and organize time series data from a variety of online databases and sources.
- Get familiar with the most common time-series econometrics models and when to use them.
- Widening of the toolbox and how to use econometrics and machine learning models in a real-world context.

Module outline

- Week 1: Introduction, Stationarity and Basic Regression Analysis with Time Series, Chapter 1
- Week 2: Autocorrelation, Partial Autocorrelation, Random Shock Form, Inverted Form, Chapter 2
- Week 3: Stationary Time Series Processes (ARMA processes), Chapter 3
- Week 4: Model Identifications and Non-Stationary Time Series Models, Chapter 4
- Week 5: Time Series Decomposition and Anomaly Detection, Chapter 5
- Week 6: Midterm Exam
- Week 7: Seasonal Time Series Models, Chapter 6
- Week 8: Forecasting: ARIMA Forecasting, Exponential Smoothing, Chapter 7
- Week 9: Neural Networks, Chapter 8
- Week 10: ESTIMATION and DIAGNOSTIC CHECKING, Chapter 9
- Week 11: VAR Models, Granger Causality and Cointegration, Chapter 11

- Week 12: Modeling Volatility by ARCH-GARCH Models, Chapter 10
- Week 13: Selected Topics: Machin Learning, Online selected
- Week 14: Selected Topics: Machin Learning, Online selected
- Week 15: Revision
- Week 16: Final Exam

Course Materials

- Lecture slides.
- Time Series Analysis, James D. Hamilton, Princeton.
- Applied Econometric Time Series, Walter Enders, Wiley.

Module Organization

- **Teaching:** 3-hour lectures per week
- **Student workload:** Approximately 6 hours of study per week
- **Feedbacks** will take the shape of one-to-one.

Assessment method:

- Mid Term Exam 30% (1 hour): week 7.
- Weekly exercises/assignments 20% (1 hour): week 11.
- Final Exam 50% (2 hours): week 16.

Course policies

To be explained to the students at the first meeting:

- ✓ **Class attendance:** Students are expected to attend all lectures of this course due to the nature of the course that adopts a cumulative learning process. A prior approval is required for class absence, except for emergencies.

*Students **absent** from class are responsible for obtaining notes of lectures and project assignments from fellow students and are responsible for turning such assignments when due. Absence is not an excuse for meeting an assignments due date.*

- ✓ **Tardy:** Arriving late are not expected in both on-campus and online lectures (if any), as it would affect the understanding of the student to the new topic, and therefore his performance in the daily exercise.
- ✓ **Class behavior:** A student is expected to pay full attention to the tutor, to respect his colleagues, and to keep the lectures and his table clean and tidy. Additionally, full attention shall be kept during the classes as the peer-to-peer learning is one of the major learning tools in the lecture.
- ✓ **Food and drinks:** Snacks and drinks with lids are allowed in the lectures.
- ✓ **Submissions and exams:** The weekly exercises are expected to be submitted on time. Late submissions are only accepted within a week of the original deadline and with 20% cut of the main grade. Failure to attend any exam or quiz will result to have a mark of zero.
- ✓ **Cheating:** Cheating in all its forms are not accepted and would result in an automatic zero for the submission/exam and would be reported to the dean to investigate the case and decide upon a suitable punishment according to the university regulations.