ΟΙΚΟΝΟΜΙΚΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΑΘΗΝΩΝ
ATHENS UNIVERSITY OF ECONOMICS AND BUSINESS
ΣΧΟΛΗ ΟΙΚΟΝΟΜΙΚΩΝ ΕΠΙΣΤΗΜΩΝ
SCHOOL OF ECONOMIC SCIENCES
ΤΜΗΜΑ ΟΙΚΟΝΟΜΙΚΗΣ ΕΠΙΣΤΗΜΗΣ
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Course Syllabus: Econometrics II

General Information:
Office address: Derigni 12 Building, 2nd floor.
Office Hours (13/2/2018-23/5/2018): Tuesday 13:30-14:30, and Wednesday 11:15-12:15.[1]
e-Class: https://eclass.aueb.gr/courses/OIK230/.[2]
Tutor Information: Alecos Papadopoulos. E-mail: papadopalex@aueb.gr
Office Hour: Thursday 11:00-12:00 (room 812).

Description-Prerequisites
The course aims to the introduction of elements of the probabilistic theory of stochastic processes and time series models, with a view towards statistical and econometric analysis. In this respect, various models of stationary and non-stationary time series along with relevant inferential procedures will be examined.
Hence several already studied notions from probability theory and statistical inference are considered as prerequisites. Those include the concepts of probability space, probability measure, random element, expectation, modes of convergence of sequences of random elements, relevant LLNs and CLTs, the theory of M-estimation (with their studied examples of the OLSE, the MLE, the GMME) and of the relevant statistical tests, their basic limit theory.
Numerical implementations will also be examined during the tutorials. Hence familiarity with the Matlab programming environment is also prerequisite.

Outline
The following consists of a synopsis of the course material. It is understood that any partial modification, rearrangement, etc, is in the instructor's facility.

1. Introduction to the theory of stochastic processes. Daniell-Kolmogorov Theorem and finite dimensional distributions, stationarity, ergodicity and mixing, covariance stationarity. Building blocks in discrete time: White noise processes. Filtrations, conditional expectations and martingale difference processes. Digression: Processes as solutions to stochastic recurrence equations

[1] The course's e-class must be consulted in all cases for possible changes.

[2] The course's e-class contains the course's blog, notes, exercises, further readings and information concerning the lectures, corrections, announcements, etc. The relevant material could be updated during the course. The students must consult the e-class systematically and are strongly encouraged to upload questions, answers, comments, etc.

(SRE's), existence and uniqueness of solution, dependence on initial conditions. Birkhoff's LLN and CLT's for dependent processes.

2. Linear processes. Strong stationarity and ergodicity. Covariance stationarity, auto-covariance functions, regularity and summability. Wold decomposition theorem. Lag operators and invertibility. Stationary autoregressive (AR), moving average (MA) and ARMA processes and their properties. Statistical inference, Quasi-MLE, GMME, filtering, numerical issues, limit theory, etc. Specification and the Box-Jenkins methodology. Conditional expectations revisited: forecasting in stationary ARMA processes and linear projections. An introduction to Indirect Inference in the context of an MA(1) model.
3. Conditional heteroskedasticity and GARCH-type models. Existence and uniqueness of stationary and ergodic solutions. Second order stationarity and potential MD properties. Representations. Statistical inference and the semi-parametric Gaussian Quasi-MLE, limit theory. Further example: the EGARCH(1,1) Model.
4. An introduction to Unit Root Econometrics. Non-stationarity, random walks , unit roots and the Wiener process. The Functional CLT and the limit theory of the OLSE for some unit root processes. Testing for unit roots: Hypotheses structure, Dickey-Fuller and Phillips-Perron tests. Limiting distributions under the null, local to unity limit theory and asymptotic properties. Spurious regression and introduction to cointegration.

Indicative Readings

The following references are merely indicative. During the lectures this catalogue can be enriched with further readings. In any case the students are *strongly advised to study from more available sources and try to solve plethora of exercises*.

1. Brockwell, P. J.,and Davis, R. A. *Introduction to time series and forecasting*. Springer, 2016.
2. Hayashi, F. *Econometrics*. McGraw-Hill, 2000.
3. Hamilton D. J. *Time Series Analysis*. PUP, 1994.
4. Gourieroux, C., and Monfort, A. *Time series and dynamic models*. CUP, 1997.
5. Gourieroux, C., and Monfort, A. *Statistics and Econometric Models*. CUP, 1995.
6. Pesaran, M. H. *Time series and panel data econometrics*. Oxford University Press, 2015.
7. Demos, A. *Notes on Time Series Models*. Lecture Notes, 2016. (http://www.aueb.gr/users/demos/time_series.pdf).