

# PhD Programme in Applied Econometrics and Economic Modelling

## Admission Exam Conspectus

1. Probability distribution function. Probability density function and probability mass function. Moments.
2. Random vectors. Transformations. Conditional distributions and moments. Independence.
3. Main properties of mean, variance, and correlation coefficient. Covariance matrix. Correlation matrix.
4. Point estimators of parameters. Unbiased and consistent estimators. Efficient (minimum-variance) estimators.
5. Confidence intervals. Testing of statistical hypotheses. Type I and Type II errors.  $p$ -value.
6. Classical linear regression model. Ordinary least squares (OLS) method. Properties of OLS estimators. The Gauss-Markov Theorem.
7. Heteroskedasticity and autocorrelation. Generalized least squares (GLS).
8. The Method of Moments (MM). The Generalized Method of Moments (GMM).
9. The Maximum Likelihood (ML) Method.
10. Time series. Stationarity. Unit root tests. Cointegration.
11. Models with dependent categorical variables. Logistic regression.
12. First- and second-order linear differential and difference equations. Conditions for stability of solutions.
13. The Solow growth model.
14. The growth model with human capital of Mankiw, Romer, and Weil.
15. The Samuelson-Hicks business cycle model.

### Bibliography

- Barro, R., and X. Sala-i-Martin (2004): *Economic Growth*, MIT Press, 2<sup>nd</sup> ed.
- Enders, W. (2015): *Applied Econometrics Time Series*, Wiley, 4<sup>th</sup> ed.
- Franses, P. H. (2014): *Time Series Models for Business and Economic Forecasting*, Cambridge University Press, 2<sup>nd</sup> ed.
- Greene, W. (2018): *Econometric Analysis*, Prentice Hall, 8<sup>th</sup> ed.
- Gujarati, D. (2017): *Basic Econometrics*, McGraw-Hill, 5<sup>th</sup> international ed.
- Hogg, R and A. Craig (2018): *Introduction to Mathematical Statistics*, Pearson, 8<sup>th</sup> ed.
- Mankiw, N. G., D. Romer, and D. N. Weil (1992): "A Contribution to The Empirics of Economic Growth," *Quarterly Journal of Economics*, 107(2), pp. 407-437.
- Ross, S. (2018): *A First Course in Probability*, Pearson, 10<sup>th</sup> ed.
- Romer, D. (2018): *Advanced Macroeconomics*, McGraw-Hill, 5<sup>th</sup> ed.
- Shone, R. (2002): *Economic Dynamics: Phase Diagrams and Their Economic Application*, Cambridge University Press

Department of Statistics and Econometrics  
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