Professor A. Yatchew
150 St. George Street
yatchew@chass.utoronto.ca
www.economics.utoronto.ca/yatchew

ECO 2401S: Ph.D. Econometrics
Tues, Thurs 9-11, For Locations Check Dept Website

EVALUATION:

Midterm	35% Thursday February 16, 2023, 9 AM – 11 AM. In class.
Final Exam	35% Exam period.
Paper	30%

The only generally acceptable reason for missing a term test is illness. A medical certificate is required under such circumstances. We are asked to remind you that plagiarism is a **serious** academic offence with potentially serious penalties.

Due dates

Outline: Friday, January 27, 202 by midnight. This is a hard deadline. Late submissions of the outline will be penalized 5% per day on the paper. Please submit electronically through Quercus. Your outline must contain the following:

1. title
2. preliminary model
3. key references (be sure to do a citation search)
4. anticipated results
5. actual numerical data on first observation.

Problem Sets: Thursday, February 16, 2023, by midnight. Please submit electronically through Quercus. Problem sets will be considered in marginal cases.

Paper: Friday, March 31, 2023, by midnight. This is a hard deadline. Late submissions will be penalized 10% per day. Please submit electronically through Quercus. You must also attach a copy of the computer code (in *.txt format) used to produce the results in the paper.

References:

Greene, William, Econometric Analysis, Prentice Hall, 8th Edition, 2018. (Previous editions are similar and cover much of the same material.)

Davidson, Russell and James MacKinnnon, Estimation and Inference in Econometrics, Oxford University Press, 2021, available at http://qed.econ.queensu.ca/ETM/ETM-davidson-mackinnon-2021.pdf .

Hamilton, James Time Series Analysis, Princeton University Press, 1994, available at http://ebookcentral.proquest.com/lib/utoronto/detail.action?docID=6303889.

Yatchew, Adonis Semiparametric Regression for the Applied Econometrician, Cambridge University Press, 2003. Available electronically through our library system.

Optional or supplementary sources are denoted with an asterisk *.

December 30, 2022

1. Nonparametric and Semiparametric Regression (3 lectures)

Nonparametric regression, curse of dimensionality, consistency, rate of convergence, bias-variance trade-off, asymptotic distribution of estimators, cross-validation -- how much to smooth, testing procedures. Estimation and inference in the partial linear model, tests of specification and equality of regression functions, index models, equivalence scale estimation.

1. Yatchew 2003, Chapters 1-5, 7.
2. Yatchew, A. "Nonparametric Regression Techniques in Economics", Journal of Economic Literature, 1998, 669-721.*
3. Greene Chapter 7.*

2. Modes of Inference: Asymptotic v. Bootstrap Techniques (2 lectures)

Weak and strong convergence, convergence in distribution, O_p and o_p notation, convergence of functions of sequences of random variables, laws of large numbers, central limit theorems, Cramer's Theorem, efficiency vs. asymptotic efficiency and the Cramer-Rao lower bound, Glivenko-Cantelli lemma, uniform laws of large numbers, consistency and asymptotic distribution of least squares and maximum likelihood estimators; likelihood ratio, Lagrange multiplier, Wald tests. Bootstrap estimates of standard errors, bootstrap based confidence intervals and hypothesis tests. Validity of bootstrap inference, Edgeworth expansions and superiority of bootstrap inference procedures.

1. Greene Appendix D Large Sample Distribution Theory; Ch. 4.4 Asymptotic Properties of Least Squares Estimators; Ch. 4.6 Delta Method; Ch. 14.4 Properties of Maximum Likelihood Estimators.
2. Yatchew 2003, Chapter 8, Appendix A.
3. Davidson and MacKinnon, Ch. 4, 5.
4. Beran R. and G.R. Ducharme (1991): Asymptotic Theory for Bootstrap Methods in Statistics, Centre for Recherche in Mathematiques, Universite de Montreal, Ch. 1,2,4
5. Horowitz, J. (2006) "Bootstrap Methods in Econometrics", in Advances in Economics and Econometrics: Theory and Applications, Seventh World Congress, Volume III, ed. D. Kreps and K. Wallis

3. Generalized Least Squares (1 lecture)

Heteroscedasticity, White's HCSE, tests for heteroskedasticity, autocorrelation, moving average models, Newey-West SE, variance components, panel data -- time series/cross-section models; mixed estimation, multivariate regression – SUR estimation, random coefficient models.

1. Greene Chapter 9.
2. Davidson and MacKinnon Ch. 7.

4. Models Where a Right-Hand-Side Variable is Correlated With the Residual (1 lecture)

Instrumental variables, IV estimation as identification via method of moments, 2SLS, errors in variables, simultaneity, Hausman-Wu specification test.

1. Greene Chapter 8.
2. Davidson and MacKinnon Ch. 8.

5. Time Series Analysis (4 lectures)

Overview - categorization of models; basic concepts -- stochastic processes, stationarity and invertibility, ergodicity, autocorrelation and partial autocorrelation functions.

ARCH and GARCH models;ARMA models - identification, estimation, inference, forecasting. Yule-Walker equations, Wold Decomposition Theorem; distributed lag models -- Almon lags, Koyck lags; ARMAX models; partial adjustment, dynamic regressions, error correction models, vector autoregressions, seasonal adjustment, spectral density estimation.

Nonstationary models -- trend stationarity, difference stationarity, random walk with/without drift, spurious regressions, ARIMA models, unit roots, tests for unit roots, Dickey Fuller and Augmented D-F tests, Weiner processes. Cointegration, testing for cointegration.

1. Davidson and MacKinnon Ch. 13, 14.
2. Greene Chapters 20,21.
3. Hamilton Ch. 15-19, 21.
4. Bollerslev, T., R. Engle and D. Nelson (1994) “ARCH Models”, in Handbook of Econometrics, vol. 4, ed. R. Engle and D. McFadden, North Holland, 2959-3040.