ECOM20001: Econometrics 1

Lecture Topics and Recommended Readings

Note: page numbers correspond to Introduction to Econometrics 4th Edition (Global Edition) by Stock and Watson.

Lecture	Concepts	Lecture Note Stock and Watson Textbook Pages
1	Introduction	Lecture Note 1 Ch. 1 (all)
2	Random processes and probabilities, discrete and continuous random variables, probability density functions, cumulative density functions, mean, variance, skewness, kurtosis	Lecture Note 2 Ch. 2, pp. 60-71
3	Descriptive statistics, joint distribution with two random variables, marginal distribution, conditional distribution, covariance, correlation, independence, distributions: Normal, Chi-Squared, Student-t, F-distribution	Lecture Note 2 Ch. 2, pp. 71-88
4	Random Sampling, Law of Large Numbers, Central Limit Theorem, estimators, hypothesis testing of population means, p-values	Lecture Notes 2 & 3 Ch. 2, pp. 89-100 Ch. 3, pp. 111-119
5	Standard error of sample mean, t-statistics, sample variance, sample standard deviation and standard error, one-sided alternatives, confidence intervals	Lecture Note 3 Ch. 3, pp. 119-128
6	Comparing means from different populations, t-statistic with small sample sizes, scatterplots, sample covariance and correlation	Lecture Notes 3 & 4 Ch. 3, pp. 128-141 Ch. 4, pp. 155-160
7	Single linear regression model, populations true values, ordinary least squares estimator, model fit, standard error of the regression	Lecture Note 4 Ch. 4, pp. 160-170
8	Least Squares Assumptions #1, #2, #3, sampling distribution of OLS estimator	Lecture Note 4 Ch. 4, pp. 170-180
9	Hypothesis testing with OLS estimator, hypothesis testing examples, one-sided alternatives, confidence intervals with OLS estimators	Lecture Note 5 Ch. 5, pp. 192-199
10	Dummy variables, heteroskedasticity and homoskedasticity, Gauss Markov Theorem, application: racial discrimination in the labour market and audit studies	Lecture Notes 5 & 6 Ch. 5, pp. 199-211 Ch. 6, pp. 228-230

Lecture	Concepts	Lecture Note Stock and Watson Textbook Pages
11	Omitted variable bias, introduction to the multiple linear regression model	Lecture Note 6 Ch. 6 pp. 230-244
12	OLS estimator for multiple linear regression, least Squares Assumptions #1, #2, #3, #4, sampling distribution of OLS estimators with multiple regression, perfect multicollinearity, dummy variable trap, imperfect multicollinearity, LLN, CLT, and marginal distributions of regression coefficients	Lecture Note 6 Ch. 6 pp. 245-253
13	Hypothesis tests and confidence intervals for single coefficient, in multiple linear regression Tests of joint hypotheses, overall regression F-statistic, F-statistic for one regression	Lecture Note 7 Ch. 7 pp. 263-278
14	Homoskedasticity-only F-statistic, testing single restrictions involving multiple coefficients, confidence sets, model specification, conditional mean independence, variable of interest and control variables, interpreting R-Squared, applications of multiple linear regression: evaluating policy, testing theory, exploring new empirical relationships	Lecture Note 7 Ch. 7 pp. 278-289
15	Non-linear regression functions, strategy for modelling non-linear regressions, nonlinear function of a single independent variable, quadratic regression	Lecture Note 8 Ch. 8 pp. 302-315
16	Polynomial regression, logarithms, logarithmic regression, linear-log models, log-linear models, log-log models	Lecture Note 8 Ch. 8 pp. 315-324
17	Adding control variables to nonlinear models, combining polynomial and logarithmic regressions, using polynomial functions for policy-relevant calculations, interactions between independent variables, binary-binary interactions models,	Lecture Note 8 Ch. 8 pp. 324-329
18	Binary-continuous interactions models, continuous-continuous interactions models, combining polynomial and logarithmic regression models with interactions	Lecture Note 8 Ch. 8 pp. 330-345
19	Combining polynomial and logarithmic regression models with interactions (cont.), application of nonlinear model estimation and testing	Lecture Note 8 No textbook readings required
20	Internal and external validity, threats to interval validity, using regressions for forecasting	Lecture Note 9 Ch. 9 (all pages)

Lecture	Concepts	Lecture Note Stock and Watson Textbook Pages
21	Introduction to time series data, lags, first differences, logarithms, growth rates, autocorrelation, autocovariances, auto covariance functions	Lecture Note 10 Ch. 14 pp. 568-577
22	First-order autoregressive model, forecasting, p-th order autoregressive model time series regressions with additional regressors, autodistributed lag model	Lecture Note 10 Ch. 14 pp. 577-586
23	Key assumptions for the autoregressive distributed lag model, stationarity, determining model lag length, modelling seasonality, Granger causality	Lecture Note 10 Ch. 14 pp. 586-597
24	Semester review, next subjects, careers in data and economics, faculty research assistantships	Lecture Note 11