

**Econometric Theory I  
January-March Outline**

| <b>Date</b> | <b>Lecture</b>  |
|-------------|---|
| Week 1      | “13 ways of looking at a random variable”<br><i>Readings:</i> BD. 1 and their Appendix<br><i>Topics:</i> RV’s dfs, qfs, densities, moments, mgfs, cumulants, cfs, tail behavior, conditional probability, independence, correlation.  |
| Week 2      | “One too many inequalities”<br><i>Readings:</i> BD. Appendix; W. 2.8-9; Pollard Appendix B<br><i>Topics:</i> Inequalities by Markov, Chebyshev, Cauchy, Jensen, Hoeffding and Bernstein.  |
| Week 3      | “Convergence á la mode and the story of O”<br><i>Readings:</i> V 2; DM.4; S.1.1-7<br><i>Topics:</i> $\rightarrow$ , $\rightarrow a.s.$ , $\rightarrow q^{th}$ , $\rightsquigarrow$ , $O_p$ , $o_p$ Slutsky, and the $\delta$ -method. |
| Week 4      | “LLN’s and CLT’s”<br><i>Readings:</i> V 2; S.1.8-9, W.9<br><i>Topics:</i> LLN’s and CLT’s   |
| Week 5      | “Generating random numbers and introduction to density estimation”<br><i>Readings:</i> Handout on R; BD 9.6<br><i>Topics:</i> Random numbers, histograms, kernel density estimation.  |
| Week 6      | “By Shape of Likelihood The News Was Told”<br><i>Readings:</i> V 7-8; DM 8; BD. 3.3, BD. 4;<br><i>Topics:</i> Likelihood, sufficiency and information.  |
| Week 6      | “Happy Families Are All the Same”<br><i>Readings:</i> BD. 2.3; V 4.2; L. 1.4<br><i>Topics:</i> Exponential family models and other examples   |
| Week 7      | “MLE Asymptotics Under Standard and Nonstandard Conditions”<br><i>Readings:</i> V 8; L. 6; Huber (1967)<br><i>Topics:</i> Consistency, Efficiency   |

*Key to references* (see Bibliography for details) V = van der Vaart DM = Davidson and MacKinnon; BD = Bickel and Doksum; S = Serfling; P = Pollard; W = Whittle