**Limit theorems and large deviation theorems of probability**
**BMETE95MM10**
**MSc final exam topics**

1. **Theory of large deviations:**

   Cramér's theorem, Hoeffding's inequality, Bernstein's inequality

2. **Weak convergence of probability distributions:**

   Equivalent definitions of weak convergence of probability measures, tightness, Helly's theorem, method of moments, extreme value theory (Gumbel, Fréchet, Weibull)

3. **Limit theorems for simple symmetric random walk (SRW):**

   Reflection principle, limit theorems for the maximum of SRW, hitting times, time spent at the origin, Paul Lévy's arcsine theorems

4. **Method of characteristic functions:**

   Properties of characteristic functions, derivatives of char. fn. and moments of the random variable, inversion formulas, Lévy's continuity lemma, weak convergence and characteristic functions, application: the coupon collector's problem

5. **Central limit theorems (CLT):**

   Stirling's formula, local CLT for binomial distribution (de Moivre's theorem), CLT with characteristic functions, Lindeberg's theorem with applications

6. **Stable distributions:**

   Stability, characterization of symmetric stable distributions, weak convergence to symmetric stable distributions, Holtsmark's problem