Differential Equations 1 - Second Part
17th January - 19th March 2011

Final Program.

1) Heat Equation. Euristic computation of the fundamental solution and its properties; Existence of solutions to the Cauchy problem and representation formula for the solutions; Tychonov's counterexample to uniqueness; Nonhomogeneous Cauchy problem and estimates near $t = 0$; Parabolic mean formula; Parabolic maximum principles; Uniqueness for the Cauchy and Dirichlet problems; Regularity of local solutions and Cauchy estimates; Parabolic Harnack inequality (without proof).
2) Maximum principles. Weak maximum principle for elliptic-parabolic second order partial differential operators; Hopf Lemma for elliptic operators; Strong maximum principle for elliptic operators.
3) Exercises sheets 1–2–3.

Bibliography.

1) Lecture notes and Exercises published on line.
2) L. C. Evans, Partial Differential Equations, Part 2.3, AMS 1998. This book is recommended.
3) E. DiBenedetto, Partial Differential Equations, Chapter V, Birkhäuser 1995