

Course Title:	<i>Long Range correlations in statistical physics</i>
Instructor	<i>Salvatore Miccichè</i>
N of hours	<i>21,0</i>
Description	Basic concepts concerning long-range interactions in stochastic processes and statistical mechanics.
Syllabus	<p>Part 1: Long-range correlations in continuous stochastic processes (9)</p> <p>1,5 Introduction to stochastic processes. Langevin equation as a motion equation in presence of noise.</p> <p>1,5 Langevin equation and Fokker-Planck equation.</p> <p>1,5 eigenfunctions methodology.</p> <p>1,5 memory properties in stochastic processes. Doob theorem.</p> <p>1,5 ergodicity.</p> <p>1,5 extreme value theory.</p> <p>Part 2: Long-range correlations in discrete stochastic processes (6)</p> <p>1,5 Markov chains.</p> <p>1,5 Hidden Markov Models.</p> <p>1,5 ARCH e GARCH stochastic processes.</p> <p>1,5 ARIMA, FARIMA, FI-GARCH stochastic processes.</p> <p>Part 3: long-range interactions in statistical mechanics (6)</p> <p>1,5 mean field theories.</p> <p>1,5 hamiltonian systems with long range interactions.</p> <p>1,5 quantum systems with long-range interactions.</p> <p>1,5 out-of-equilibrium long-range correlations.</p>
Bibliography	<p>The Fokker-Planck Equation: Methods Of Solution And Applications, Hannes Risken, ISBN-13: 978-3540615309</p> <p>Stochastic Methods: A Handbook for the Natural and Social Sciences, Crispin Gardiner, ISBN-13: 978-3540707127</p> <p>Statistics for Long-Memory Processes, Ian Beran, ISBN: 9780412049019</p> <p>Physics of Long-Range Interacting Systems, Campa, Dauxois, Fanelli, Ruffo, ISBN: 978-0199581931</p>