Course title: Statistical Foundations for Finance

Course Basic Information	
Academic Unit: (University/Department)	University of Zurich, Department for Banking and Finance
Course title:	Statistical Foundations for Finance Long title/Subtitle: Mathematical and Computational Statistics with a View Towards Finance and Risk Management
Level:	Master of Science UZH ETH in Quantitative Finance
Course Status:	Core MF
Year of Study:	**Fall Semester**
Number of Classes per Week:	4h lectures
ECTS Credits:	**6 ECTS**
Time /Location:	|According to the timetable in UZH course catalogue
Lecturer:	Prof. Dr. Marc Paolella
Content	
Content of the course	We begin with some relevant material from probability and distribution theory, including moment generating and characteristic functions, the standard inversion theorems, convolutions and other functions of two random variables, the use of saddlepoint approximation for inverting the MGF, and (briefly covering) the use of the FFT for inverting the CF. Also covered are some theory on financial risk measures, such as value at risk and expected shortfall, these being essential in quantitative risk management and portfolio optimization. The rest of the course is dedicated to statistical inference in the so-called IID setting, with emphasis on distribution theory and computational methods. Topics include the bootstrap, distributional hypothesis testing, the (mis-)use of p-values, theory of maximum likelihood estimation, various alternative estimators, shrinkage estimation, discrete mixture distributions, the EM-algorithm, and tail estimation. Required is the textbook "Fundamental Statistical Inference: A Computational Approach", by Marc Paolella, published by John Wiley and Sons (2018). We will cover (parts of) chapters 1, 2, 3, 4, 5, 7, and 9. There is no final exam, but rather 4 or 5 take-home assignments involving computer programming of the methods and techniques we discuss.
Course's objectives:	Besides learning all the aforementioned topics, students will be extensively "mapping" theory to computer algorithms, thus enhancing their programming skills in any of the major prototyping languages. The contents of the course (and emphasis on computer programming) cover numerous critical skills for students wishing to become "quants" in finance.
The expected outcomes:	On successful completion of this module, students should be able to: Be fluent with the major aspects of the aforementioned (large) list of topics, and have confidence and competence in (i) being able to implement the methods computationally, and (ii) be able to read, understand, and implement theory and methods from the academic literature in quantitative finance, financial econometrics, and quantitative risk management.