



**LUND**  
UNIVERSITY

Centre for Mathematical Sciences  
Mathematical Statistics  
Nader Tajvidi, Associate Professor

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Information on the course in extreme value theory

## Statistical Modeling of Extreme Values

*Goal:* To learn the basic results of the extreme value theory that aims at the estimation and prediction of extremal behaviours.

*Course overview:* Extreme value theory concerns mathematical modeling of extreme events. Recent developments have introduced very flexible and theoretically well motivated semi-parametric models for extreme values which now are at the stage where they can be used to address important technological problems on handling risks in areas such as wind engineering, hydrology, flood monitoring and prediction, climatic changes, structural reliability, corrosion modeling, and large insurance claims or large fluctuations in financial data (volatility). In many applications of extreme-value theory, predictive inference for unobserved events is the main interest. One wishes to make inference about events over a time period much longer than that for which data are available. For example, insurance companies are interested in the maximum amount of claims due to storm damage during, say, the next 30 years, based on data from the past 10–15 years. In bridge design a major factor is the maximum wind speed that can occur in any direction during the life of the bridge. However, the dataset used to estimate a return value for high wind speeds is often recorded over a much shorter time period than the expected lifetime of the bridge.

Statistical modeling of extreme events has been subject of much practical and theoretical work in the last few years. The course will give an overview of a number of different topics in modern extreme value theory including the following topics:

- Statistical methods for extremal events,
- Some examples of application of the theory in large insurance claims due to windstorms, flood monitoring and pit corrosion,
- Exercises on detailed “step-by-step” use of extreme value modeling, and
- Discussion of some open problems in the field.

*Literature:* Coles S. (2001) An Introduction to Statistical Modeling of Extreme Values Springer-Verlag London, and lectures notes and copies of research papers.

*Homepage for the course:* [http://www.maths.lth.se/matstat/staff/nader/stint/ext\\_value.html](http://www.maths.lth.se/matstat/staff/nader/stint/ext_value.html).