Home page
Home page of course is in https://canvas.education.lu.se/courses/4572/ and will be updated regularly.

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The office is located on the second floor at the Centre for Mathematical Sciences building, south part.

Lectures and Exercises
See the last page for the schedule.

Computer laboratory sessions
Three computer laboratory sessions are scheduled in the course (see below for the schedule). The main goal of the computer sessions is to provide the basic knowledge on how to use the extRemes toolkit which is an interactive program for analyzing the extreme value data using the R statistical programming language. Both the R software and the package extRemes are free software which can be downloaded from http://www.r-project.org.

Note that the computer lab sessions will be held online as Zoom e-meetings. During these sessions in Zoom the students will have the opportunity to ask questions about the assignments but each student (or group of two students) will need to submit a report for each computer assignment. The assignments will be graded as pass or fail and the grades will be published in the home page of the course.

Literature


Other literature references


We will only use a few sections of the last two books and the lecture notes with a couple of handouts will cover all the theory which is needed for the course. These books are also available at our library and are recommended as a general reference for probability theory and statistics in an intermediate level.

**Handouts**

The handouts will also be available in the course shelf outside the Mathematical Statistic’s expedition on the second floor.

**Exams**

Please check [upcoming exams in the Centre for Mathematical Sciences](#) or Lund University’s exam schedule [“TimeEdit”](#) for the scheduled exams at LTH.

**Allowed aids in the exams**

1. Collection of formulas: *Table of Formulae* and Appendix 2 on “Some distributions and their characteristics”.
3. Calculator.
4. Dictionaries for translation.

**Important reminders**

1. Please note that in accordance with Lund university’s policy, sound recording, photography and filming during the lectures are **not permitted**. The corresponding document is available in the home page of the course. **Please note this applies even to Zoom e-meetings.**

**Teaching plan**

In the following page L, T, C stand for “Lectures”, “Theoretical exercises” and “Computer lab”, respectively.
Study week | Chapter
---|---
1 | Chapter 1 (Coles), functions of random variables (lecture notes)
   L: Examples of extreme value theory applications, Transformation of random variables
   **Handout: Exercises, Collection of formulas, Some distributions and their characteristics**
   L: Chapter 2.1-2.5 (Coles), Chapter 8.5.2-8.5.3 in Rice
   **Handout: Chapter 1 (Gut): available also as e-book at the library**
   T: Exercise 1, 3, 4, 5, 6

2 | Chapter 2.6
   L: Maximum likelihood method (mle), Asymptotic distribution of mle in one dimension, Fisher information, asymptotic distribution of mle in the general case.
   **Handout: Chapter 8 (Rice)**
   L: Hypothesis testing, Neyman-Pearson’s lemma, Generalized likelihood ratio test, Profile likelihood confidence intervals, graphical methods for goodness of fit
   T: Exercise 9, 10, 11, 12, 13, 15

3 | Chapter 4 in Gut
   L: Order statistics
   **Handout: Chapter 4 (Gut): available also as e-book at the library**
   L: Convergence in distributions, Extremal types theorem
   T: Exercise 17, 18, 20, 21, 22, 28, 29, 30, 31

4 | Chapter 3.3
   L: Max-stable distributions, inference for GEV, return level, return period
   L: More on return level plots, example 3.4.1. Introduction to R and `extRemes` package
   **Handout: Computer assignment 1**

5 | Chapter 4
   L: Thresholds models
   L: Extremes of dependent sequences
   T: Exercise 36, 38, 40, 41, 43, 35

6 | Chapter 6
   L: Extremes of non-stationary sequences. Different ways of modeling non-stationarity with some examples
   **Handout: Computer assignment 2**
   L: Point processes for extremes, connection with block maxima and POT-model
   **Handout: A couple of previous exams with solutions**
   T: 47, 48, 52, 53, 32
   C: Computer assignment 1

7 | Chapter 7.7-7.8
   L: More on point processes with some examples of non-homogeneous Poisson processes, point process analysis of Wooster temperature data
   **Handout: Computer assignment 3**
   T: 55, 57, 58, 59
   C: Computer assignment 2

8 | Chapter 8.1-8.3
   L: Introduction to copulas and multivariate extremes with applications on risk management, climate change and insurance. Introduction to the course FMSN15/MAST23.
   T: Review of exercises and old exams
   C: Computer assignment 3

**TP5 Exam:** Wednesday June 3, 14.00-19.00, VIC:3A, VIC:3B