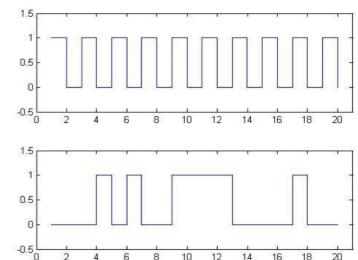
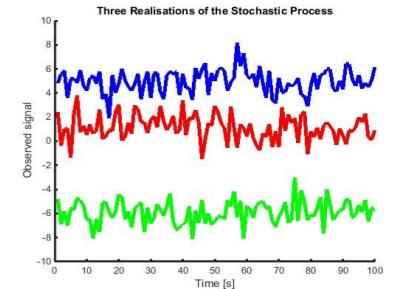


Introduction to Stochastic Modelling and Processes (SMP)

Gunvor Elisabeth Kirkelund
Lars Mandrup

Why Stochastic Modelling and Processes?

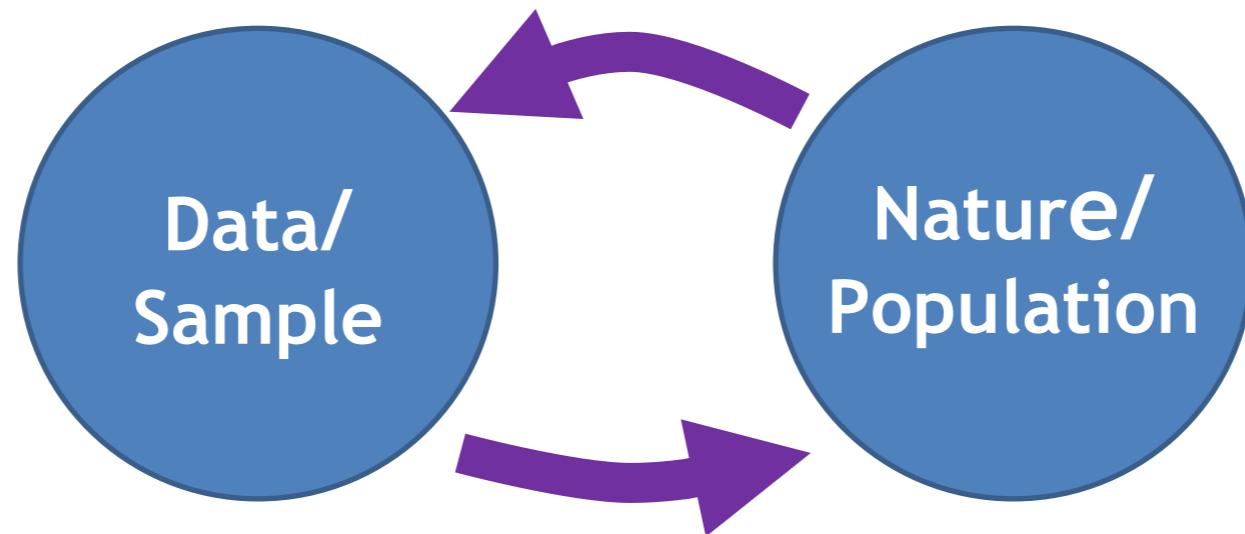
- All scientific and engineering work contain some element of randomness
 - How can I get anything out of this noisy signal?
 - How much can I conclude from my measurements?
 - How many tests / size of population do I have to do to validate my system/method/model?
- Stochastic processes is a way to handle and modelling the randomness
- Mandatory if you want to take a master degree



Content of the Course



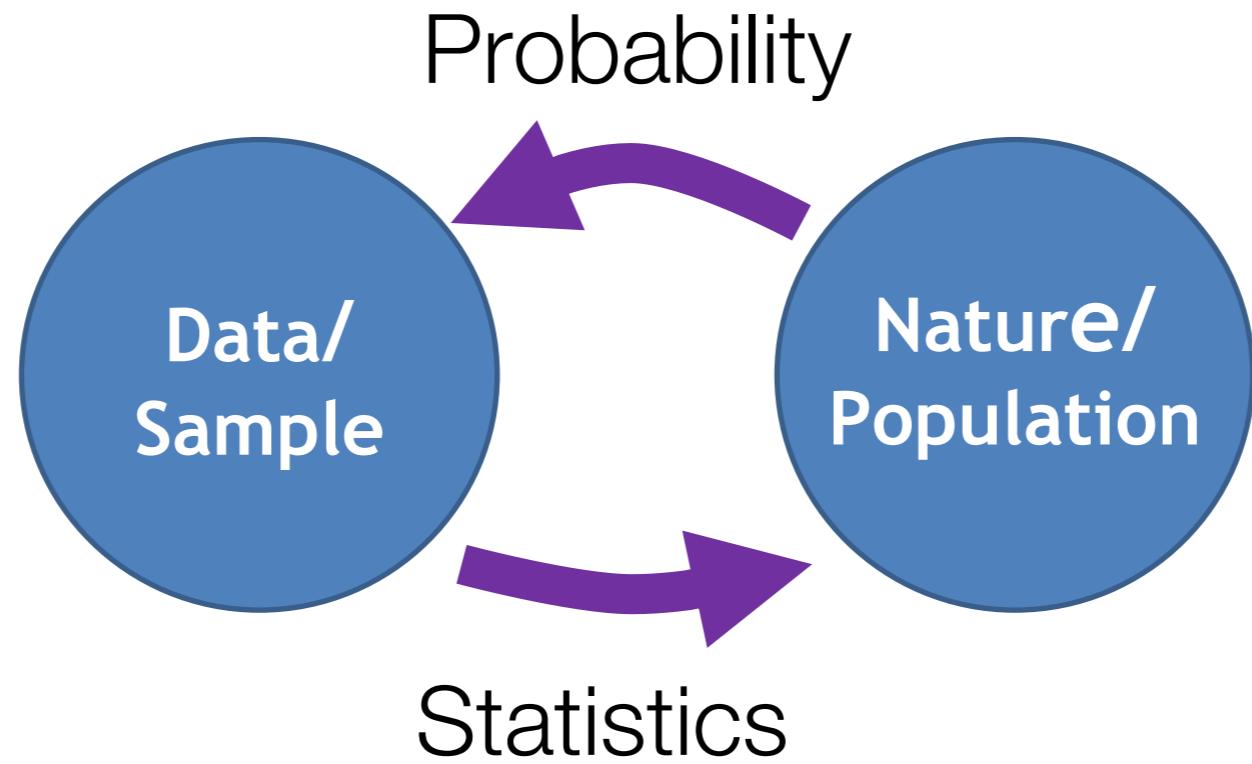
- Probability theory tells us what is in the sample given nature.
Given a regular dice probability theory can tell me how many times I will get a 6, when I roll the dice 100 times.



- Statistics tells us about nature given the sample.

*Rolling an unknown dice 100 times, I 12 times get a 6.
Statistics tell me the nature of the dice (is it regular or not).*

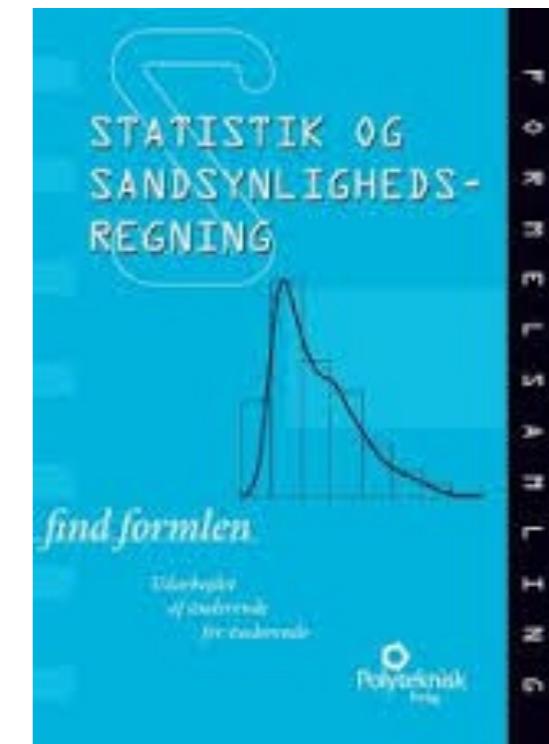
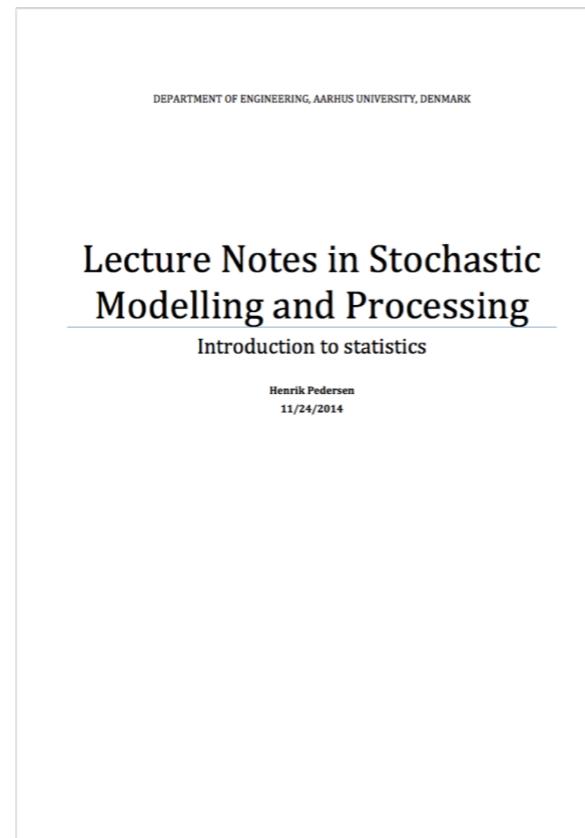
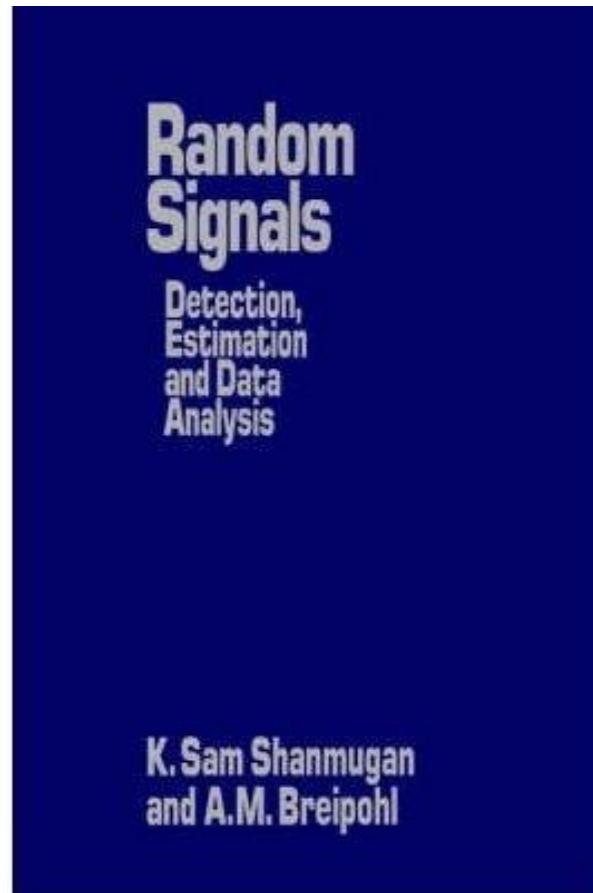
Topics



- Probability Theory and Stochastic Processes
 - Basic probability theory
 - Probability distributions
 - Stochastic (random) processes
- Statistics
 - Statistical tests
 - Model estimation
 - Linear regression

Curriculum

- “*Random Signals*”, Shanmugan and Breipohl, chap. 2, 3 and 8
- “*Lecture Notes in Stochastic Modelling and Processing*”, H. Pedersen (supplementary - statistics)
- “*Statistik og Sandsynlighedsregning - find formlen*”



Course Format

- One 4 hours lesson each week in 14 weeks

Exam

- 3 hours written exam

Teachers:

- Lars Mandrup, room 306E, Ima@ase.au.dk
- Gunvor Elisabeth Kirkelund, room 300E, gek@ase.au.dk

Lecture Format

- The course will consist of 4 hour lessons each week.
- In the first 2 hours we will give introductions to each topic.
- In the second 2 hours you will work in groups to solve different types of Group Assignment problems related to the curriculum.
- As the time during these 4 hour sessions are very limited we expect you to have read the curriculum and solved the introductory assignments before the lecture. Solutions will be provided to all introductory assignments.

What we expect before you begin the course

- You know how to integrate and differentiate
 - Know about convolution of two functions
 - Have a basic knowledge of Matlab
-
- And have installed Matlab