# MOD550
# Fundaments of Machine Learning for and with Engineering Applications

## 00 – Introduction

University of Stavanger

*Reidar B Bratvold*

*and*

*Enrico Riccardi*

Chapter 3

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## About me

Professor Reidar B Bratvold

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# Reidar B Bratvold – Who is this guy?

- o Education
  - – PhD Stanford University – Engineering
  - – MSc Stanford University – Math
  - – MSc U. of Tulsa – PetEng
  - – Business education – INSEAD, Stanford, MIT
- o Work
  - – Now: Prof. at U. of Stavanger
  - – Previously
    - ◆ Prof at NTNU
    - ◆ Prof. U. of Adelaide, Australia (still adjunct prof at Adelaide)
    - ◆ Vice President Halliburton, Houston, US
    - ◆ General Manager Software Solutions, Smedvig Technologies (Roxar)
    - ◆ Initiator of software start-up: ODIN, key application STORM
    - ◆ Scientist with IBM: US, Italy and Norway
    - ◆ Reservoir engineer with Statoil
    - ◆ Roughneck and Roustabout, North Sea

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# Reidar B Bratvold – Who is this guy?

- o Industry courses
  - – ExxonMobil, Shell, Unocal, BP, Equinor, Statoil, BG Group, Norsk Hydro, NPD, Mærsk, DONG, Santos, Aker BP, Stuart Petroleum, Saudi Aramco, PETRAD, PETROM, Gaz de France, RAG, BG, Egypt National Oil Company, Bangladeshi Petroleum Directorate, Addax Petroleum, PGNiG, OMV, Neptune, Pakistan Petroleum Ltd
  - – A number of public courses, including SPE courses
  - – Executive education at U of California, Berkeley
- o Other
  - – Elected Fellow in the *Society of Decision Professionals*
  - – Elected Member in the *Norwegian Academy of Technological Sciences*
  - – Four times served as SPE Distinguished Lecturer

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## What we will cover in my lectures

| Date | Topics |
|------|--------|
| 18.02 | Univariate and multivariate distributions<br>Spatial interpolation |
| 20.02 | Kriging |
| 25.02 | Big Bayesian picture<br>Bayes' rule<br>Bayes for events<br>Bayes for Random Variables |
| 27.02 | Bayesian inference for simple models<br>Value of Information |
| 04.03 | Bayesian inference for continuous distributions<br>Gridding<br>Beta-Binomial Model<br>Conjugate families |
| 06.03 | Posterior inference and prediction<br>Approximating the posterior |
| 11.03 | MCMC methods |
| 13.03 | Naïve Bayes classification |

### Objectives – after these lectures you should:

- Be (somewhat) comfortable with univariate and bivariate statistics

- Understand the basics of spatial interpolation

- Be comfortable with Bayesian reasoning and analysis

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## Lectures: In-class, Teams, Streaming or all of the above?

- o We will do a mix of in-class and web-based lectures
  - I will announce before the start of each week what it will be
  - On Thursday, the 20th, we will have a Teams-based class
- o Quizzes
  - I plan to use a quiz once a week
- o Problem sets (optional)
  - If so, we will use some of the class time discussing the solutions
  - I will not pass out any solutions
  - The problems will be representative (not identical) to the problems I will suggest for the exam
  - What do you want?

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