
Welcome to
EE2S31 Signal Processing

Lecturers

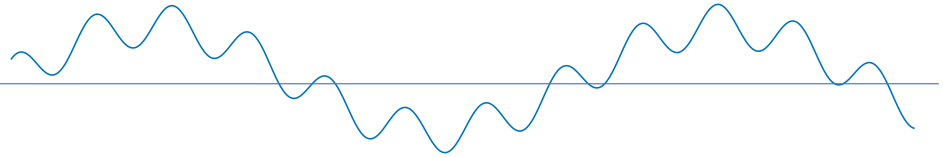
Alle-Jan van der Veen
(A.J.vanderVeen@tudelft.nl)

Borbala Hunyadi
(B.Hunyadi@tudelft.nl)

Circuits and Systems (CAS) group, Department of Microelectronics

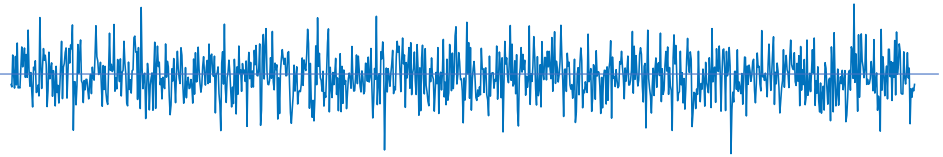
Signal Processing

deterministic

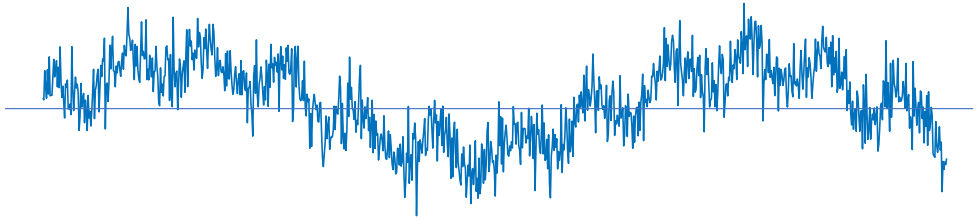


Spectrum (DFT / FFT)

random



Spectrum ?



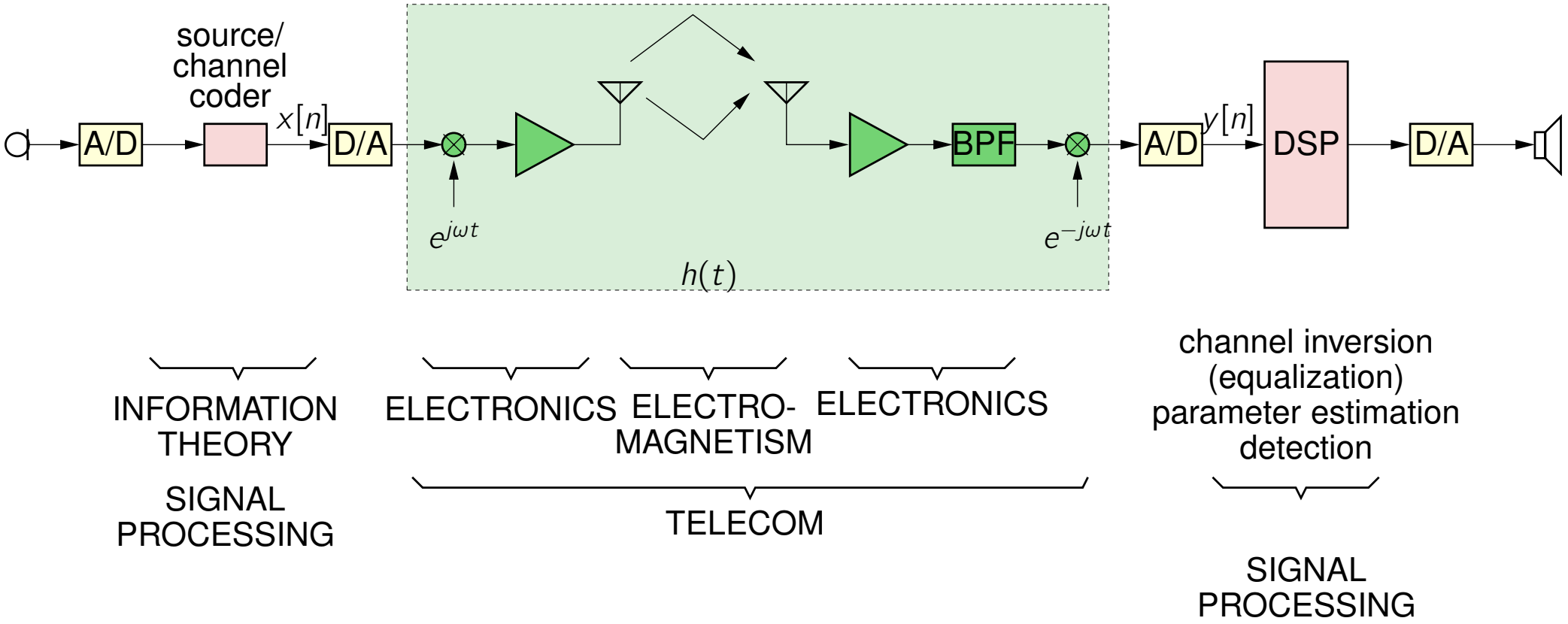
H(z)

??

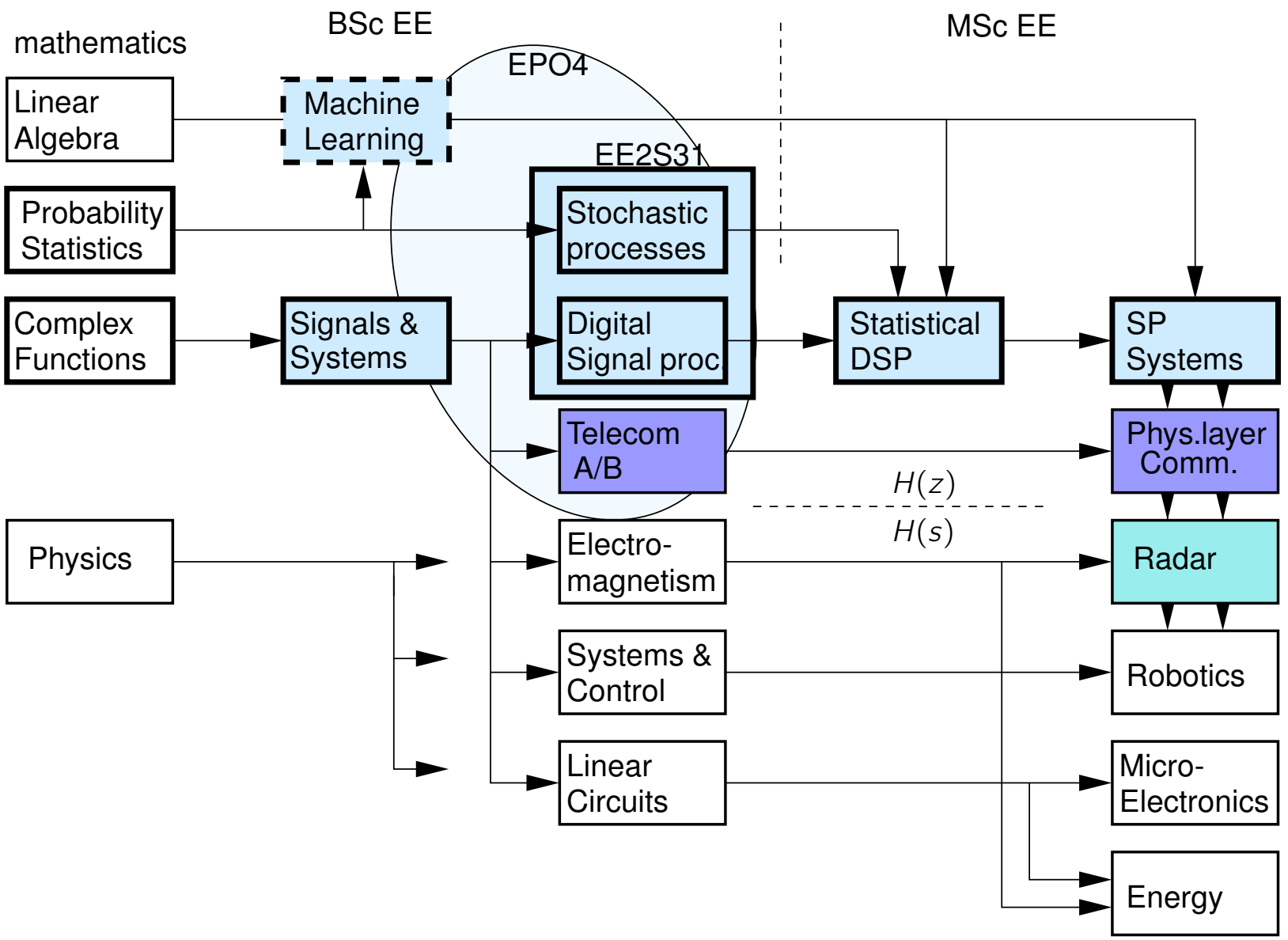
Overview of signal processing

- **Techniques and Methods**
  - Sampling and reconstruction (compressive sensing)
  - Statistical signal processing (parameter estimation, detection), machine learning
  - Analytical techniques (e.g. linear algebra, optimization)
  - Distributed processing, graph signal processing
  - DFT, filters, filter banks
  - Adaptive filters, neural networks
  - DSP hardware, fast algorithms/architectures
- **Applications**
  - Communication, radar, sonar, sensor arrays (multichannel signal processing), information theory
  - Speech and audio processing
  - Image, video and multimedia processing
  - Biomedical/bioinformatics

Example: telecom



Context


mathematics
BSc EE
MSc EE
EPO4
EE2S31
Linear Algebra
Machine Learning
Probability Statistics
Stochastic processes
Complex Functions
Signals & Systems
Digital Signal proc.
Statistical DSP
SP Systems
Telecom A/B
Phys.layer Comm.
H(z)
H(s)
Physics
Electro-magnetism
Radar
Systems & Control
Robotics
Linear Circuits
Micro-Electronics
Energy

Organization

- Lectures (2 or 3 per week), recorded on Collegerama
- Self-study:
  - Book
  - Recorded video lectures (Collegerama)
  - Exercises, past exams (Brightspace)

Two independent tracks:

- Stochastic Processes (SP)
- Digital Signal Processing (DSP)

Where to find information

- Website:
  - `http://cas.tudelft.nl/Education/courses/ee2s31/`
  - Overall schedule, book chapters, links to Collegerama recordings from 2016
  - Collegerama 2016 version not recommended for DSP track (ordering of material does not always align)

- Brightspace:
  - Announcements, discussion forum
  - Detailed weekly schedule including links to self-study materials

Exam

Dates (2022):

- Part 1: Mid-term on 17 May
- Part 2: Final exam on 24 June

Content and evaluation:

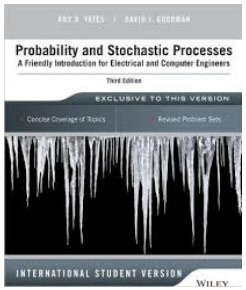
- Both parts will consist of exercises from SP and DSP (50/50)
- The end result is the average of the mid-term and final exam
- The resit consists of both parts (i.e., partial results are not valid anymore)

Format:

- Written exam
- Closed-book, we recommend to make a 2-page summary

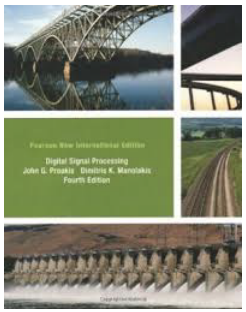
Literature

- Stochastic Processes:



R.D. Yates and D.J. Goodman, Probability and Stochastic Processes: A Friendly Introduction for Electrical and Computer Engineers

- Digital Signal Processing:



J.G. Proakis and D.G. Manolakis. Digital Signal Processing. Pearson New International Edition