

TFY 4185

Måleteknikk

Measurement Techniques

Course responsible

- Lectures

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- Laboratory

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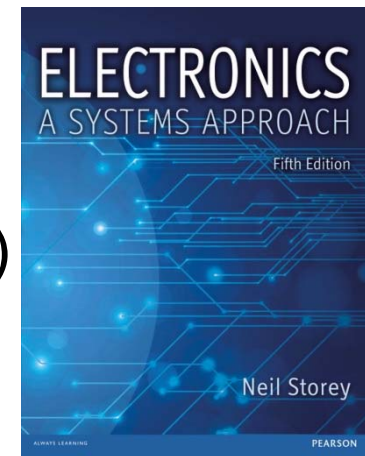


TFY4185 Måleteknikk/Measurement techniques

- Text book:

Electronics: A systems approach (5th or 6thed.)
by Neil Storey

Currently available in the Sit bookstore



- Course material

Text, Overheads, Lecture notes, Problem sets/solutions (English)

Lectures and Exam will be in English

Laboratory instruction will be in Norwegian/English

Laboratory evaluation will be in Norwegian/English

Laboratory schedule and format

- Register for a lab section now via Blackboard
- First laboratory session week 37 (13-17 September)
- Typically:
 - Four “ordinary” sessions with lab assignments
 - Six lab sessions to work on a project
- Evaluation:
 - Half hour presentation of project to Lise and I:
 - What you designed,
 - The measurements to show how the design functioned
 - Demonstration of the hardware

New this year (thanks to Covid)

- There are pre recorded lectures in Norwegian (with English overheads)
 - Available at:
<https://mediasite.ntnu.no/Mediasite/Catalog/catalogs/tfy4185-h16>
- I will broadcast English lectures via Zoom
 - Mondays 14.15-1600 and Tuesdays 14.15-1600
 - Zoom link will be posted

Mandatory work

- Laboratory—Must achieve a pass to take exam
 - Evaluations will take place during week 47
 - Must be passed in order to register for the final exam
- Lectures—Written final exam also pass/fail
 - Digital exam via Inspira
 - May be home exam depending upon circumstances

Evaluation

- Course is graded at Pass/Fail (Bestått/Ikke-bestått)
- Laboratory assessment (50%) is the mandatory work
- Lecture course assessment (final examination) (50%)
- MUST ACHIEVE A PASS (41% OR BETTER) ON **EACH SECTION** (LAB AND EXAMINATION)
- Lab must be passed to take the examination
- Problem exercises will be given.
They are recommended, but are NOT mandatory work for the course

NON-Mandatory work: Problem Exercises

- Download the pdf file and work out the problems.
- Choose the multiple choice answer closest to your solution.
- Enter the multiple choice selection via the Blackboard “test”.
- Upon submission, your assignments will be graded and incorrect questions will be flagged.
- You can correct the incorrect answers and re-submit your assignment up to 4 times.
- Questions will be of a *similar* nature to those on the final exam (but not necessarily the same questions).
- I will be available for the problem sessions on Tuesdays at 16:15-17:00 via Zoom

Course Content

- **Course content**

Electronic circuit elements: Passive circuits. Semiconductors. Active circuits, with amplifiers. Digital circuits.

Laboratory in circuit techniques: Construction and testing of selected circuits.

Computer laboratory: Simulation and testing of circuits with computer programs.

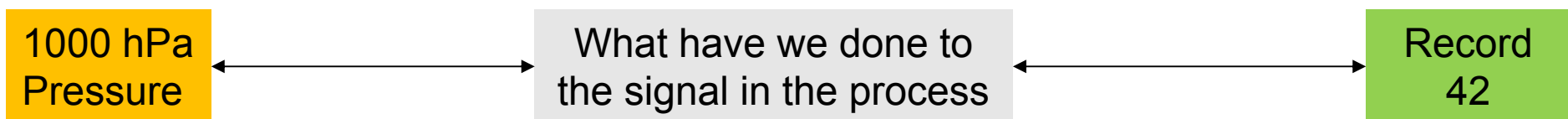
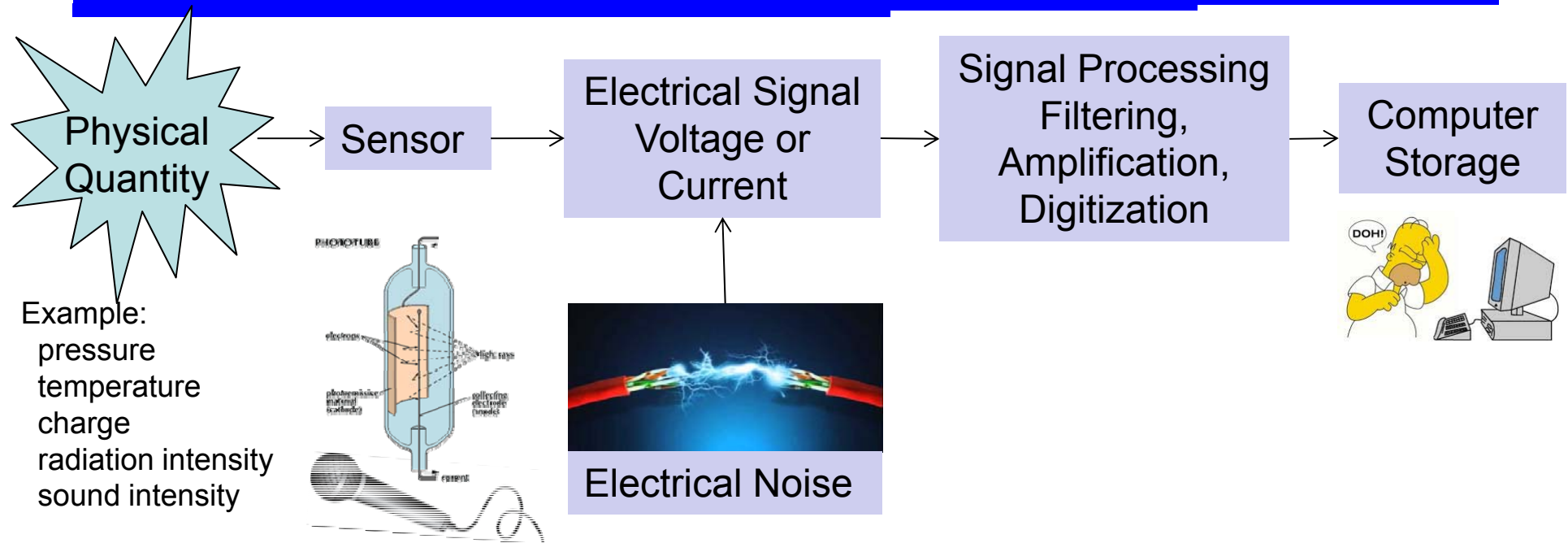
- ***Why Measurement Technique***

Most sensors/transducers will output a voltage

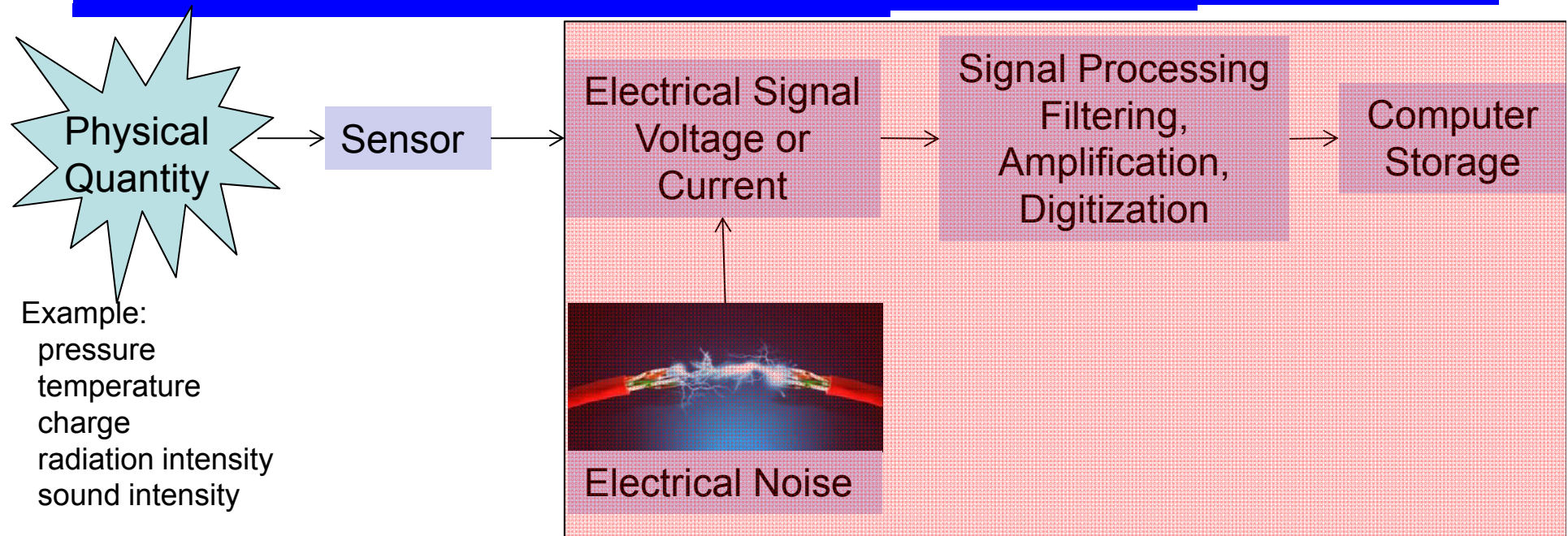
This voltage must be acquired/recorded

Any distortions in the process must be known to recover signal

Typical “measurement”



Typical “measurement”



We will focus on how to do this part
Will keep track of how the recorded signal
relates to that provided by the sensor,
while minimizing the noise contribution

Learning Outcomes

- **Learning outcome**

The course will prepare students to use and design electronic circuits, primarily oriented towards measurements and solving measurement problems.

The students will learn to build and analyze passive circuits with regard to time and frequency response by using complex calculus.

The students will learn to build and analyze active electronic circuits that consist of operational amplifiers and transistors, as well as analyzing these by means of numerical tools. The students will learn how to build electronic circuits for practical purposes in the laboratory, and will acquire knowledge of analogue and digital/logical circuits, as well as the structure of microcontrollers.

Realistic goals/outcomes

- ***Not*** to be electrical engineers
- Knowledge and recognition of typical circuit structures
- Ability to do *simple* circuit design and analysis
- Ability to debug electronics that are not functioning
- Ability to build simple circuits, analogue and digital, needed for instrument interface