

## Course: Adaptive Filters

credits: 5

|                     |                  |                          |                               |
|---------------------|------------------|--------------------------|-------------------------------|
| <b>Course code</b>  | SEVM21AF         | <b>Modes of delivery</b> | Lecture                       |
| <b>Name</b>         | Adaptive Filters |                          | Project-based learning        |
| <b>Study year</b>   | 2026-2027        | <b>Assessments</b>       | Adaptive Filters - Assignment |
| <b>ECTS credits</b> | 5                |                          |                               |
| <b>Language</b>     | English          |                          |                               |
| <b>Coordinator</b>  | B.D. Williams    |                          |                               |

### Learning outcomes

At the end of this module the student is able to:

- understand the link between Fourier analysis and the Z-transform.
- create and understand how a digital filter (FIR/IIR) works.
- clean data using advanced filtering techniques, including the Wiener filter, (normalized) Least-Mean-Square (LMS) adaptive filters, Recursive Least Squares (RLS) adaptive filters, and Kalman filtering.
- describe systems in the time-domain and/or frequency domain using stationary discrete-time stochastic processes and models, such as autoregressive (AR) and moving-average (MA) models.

### Content

The course covers the following topics:

Z-transform, FIR and IIR filters, stationary discrete-time stochastic processes and models, (normalized) Least-Mean-Square adaptive filters, Recursive Least Squares Adaptive Filters and Kalman filtering, model simulation tools, model-based reasoning.

### Included in programme(s)

Smart Systems Engineering

### School(s)

Engineering, Life Sciences & ICT