

Connecting mathematics education to engineering through contextual problems.

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Abstract

At the University of Twente the service mathematics courses all form “the mathematics line”, meant to be a series of cohesive courses that form a strong basis on which all the technical programmes can build. After their first year most students at UT have had the same mathematics topics. Meanwhile the Twente Educational Model (TEM or TOM) organizes the teaching into modules that have a thematic coherence around disciplinary courses culminating into a project. So the mathematics line and the modular structure of TOM exist in tension with one another where the teaching of any one topic, linear algebra and calculus, is the same for all disciplines but is simultaneously supposed to be part of several very different modules simultaneously. One means of alleviating this tension is to use “case studies” which are contextualised problems addressed outside the standard lecture-tutorial schedule aimed at linking the mathematical topic with the discipline. In this 4TU.AMI talk we shall present and discuss several of the existing case studies as illustration of the process.

Biographies

Tracy Craig is a lecturer in the department of Applied Mathematics in the chair of Applied Analysis. Her teaching focus is on first-year courses, typically calculus and linear algebra. Her research interests are in the field of mathematics education and engineering education. She taught and carried out research at the University of Cape Town 1998-2017 (mostly in the engineering academic development programme ASPECT) and joined the University of Twente in 2018.

Hil Meijer is an assistant professor (UD) in the group Applied Analysis at the Department of Applied Mathematics at the University of Twente. His research interests are in applied dynamical systems theory. He is a co-developer of [MatCont](#), a leading bifurcation analysis toolbox, for which he has contributed new numerical algorithms as well as given courses and tutorials on its use. This toolbox is also used to explore computational models for clinical neuroscience aiming at improved diagnostics. He collaborates with several clinical centers to analyse real clinical data. Current projects focus on neurostimulation for improved stimulation protocols in epilepsy surgery (with UMC Utrecht) and Parkinson's disease (Maastricht). Previous projects considered sensory processes, in particular somatosensation in relation to pain, and neuromodulation with deep brain stimulation working closely with the Biomedical Signals and Systems group at the UT on these topics for theory and experiments. Teaching involves Calculus, Linear Algebra, Nonlinear Dynamics, Matlab, and Numerical Methods for Biomedical Engineering and Applied Mathematics.

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