

# DSS Statistics Seminar

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<https://uniroma1.zoom.us/j/86881977368?pwd=SWRFcVFjMDZTa0lXZk05TE1zNm5adz09>

Passcode: 432940

A time-heterogeneous rectangular latent Markov model with covariates to measure dynamics and correlates of student's learning abilities data

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Accurate and up-to-date assessments of students' abilities are essential for personalised learning. These assessments allow instructors to adjust class content to match different skill levels, and help students gain awareness of their learning paths. While technology-based learning environments have eased data collection, arguably they have brought important challenges for analysis, mainly relating to data complexity. This work introduces a novel fully time-heterogeneous rectangular latent Markov specification, tailored to complex longitudinal data of this kind. The proposed toolkit incorporates measurement model heterogeneity, allowing for possibly as many different measurement models as the number of distinct measurement occasions. The structural model, in which we include predictors of initial and transition probabilities, is consequently specified, and informative dropout is modelled explicitly and jointly with its potential correlates.

However, the resulting model is overly complex to estimate with standard simultaneous procedures. We address the estimation problem by designing a bias-adjusted three-step estimator, which separates the estimation of the measurement models from the structural model fit. Our primary empirical aim is to analyse the abilities and progression in learning statistical topics over time of a concrete cohort of students, while accounting for their individual characteristics. Results from an extensive simulation study substantiate our empirical findings.



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