

S E M I N A R



Mia Meyer (*Stellenbosch University*)

Mia is a Machine Learning Engineer at Saigen and will graduate with a Master's degree in Statistics and Data Science in March 2026. She holds a degree in Actuarial Science, as well as an Honours degree in Mathematical Statistics.

Date:

Friday, 24 April 2026

Time:

13h10-14h10 SAST

Venues:

- Room 2048
Van der Sterr Building,
cnr Victoria & Bosman Streets
Stellenbosch
- Online

WHO SHOULD ATTEND?

All are welcome.

ENQUIRIES:

Elizna Huysamen

☎ +27 (0)21 808 3244

✉ krugere@sun.ac.za

Bayesian study on tumour burden using functional uniform priors in nonlinear mixed-effects models

ABSTRACT:

The choice of the noninformative prior for the model parameters in a Bayesian analysis of nonlinear (mixed) models has received significant attention in the literature. This thesis considers the use of a functional uniform prior (FUP) within nonlinear (mixed) models, specifically in dose-response and tumour growth inhibition (TGI) model applications. Traditional noninformative priors like uniform and the Jeffreys priors are widely used in the pharmaceutical industry; however, they can be quite informative in nature when mapping them onto a nonlinear functional space. Additionally, the Jeffreys prior depends on the full data structure being available when deriving it in the context of clinical trials. Bornkamp (2012) derived the FUP for a few nonlinear regression models, including exponential, power and hyperbolic-Emax models, but did not consider nonlinear mixed models. An extensive Bayesian simulation study is conducted to evaluate the operating characteristics of the FUP when compared with these standard traditional priors. The Bayesian simulation study is extended to mixed-effects models, specifically the exponential one-parameter models and the two-parameter TGI model. Finally, the performance of the FUP is explored when analysing oncology data on colorectal cancer.

The FUP has the theoretical advantages of being transformation-invariant and of satisfying the likelihood principle. While the FUP approximates the Jeffreys prior, it also has the advantage of being specified prior to data collection, in contrast to the Jeffreys prior.

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