AN INTRODUCTION TO BAYESIAN METHODS
FOR SCIENTISTS

Daniel Gianola

University of Wisconsin-Madison

USA

SYLLABUS OF COURSE AT

UNIVERSITY OF PADOVA, ITALY

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- **Lectures (theory WITH examples) last about 3-4 hours in each of 5 days** .

- 1. Statistical methods and their Bayesian treatment.

- 2. Review of ordinary least-squares, generalized least-squares, maximum likelihood and best linear unbiased prediction.

- 3. Bayes theorem: conditional probability and inference.

- 4. Prior distributions versus random effects models.

- 5. Joint, marginal and conditional posterior distributions with examples.

- 6. Sampling and Markov chain Monte-Carlo methods (MCMC)

- 7. Bayesian model comparison.

- 8. Bayesian linear regression model.

- 9. Hierarchical models.

- 10. Bayesian prediction.

Support bibliography

- Albert, J. 2009. Bayesian Computation with R. Second Edition. Springer.

- Carlin, B. P., Louis, T. A. 2008. Bayesian Methods for Data Analysis, Third Edition. Chapman & Hall/CRC

- Gelman A., Carlin, J. B., Stern, H., Dunson D. V., Vehtari A, Rubin, D. B. 2013. Third Edition. Chapman&Hall/CRC.

- Kruschke, J. K. Doing Bayesian Data Analysis. Second Edition. Elsevier.

- McElreath, R. 2016. Statistical Rethinking. Chapman & Hall/CRC.