



University of Pavia

Department of Brain and Behavioral Sciences
Medical Statistics and Genomics Unit

1st International Summer School

“Introduction to Bayesian Data Analysis with Stan”

Jonah Gabry

Columbia University

Leonardo Egidi

University of Padova



Pavia, 10-14 September 2018

Jonah Gabry is core developer of the widely used open-source Stan software for statistical modeling and a researcher in statistics at Columbia University collaborating primarily with Andrew Gelman on methods and software for Bayesian data analysis. Jonah is an author of the `rstan` and `rstanarm` R packages, which provide interfaces to Stan, as well as the author of the `shinystan` and `bayesplot` packages for model visualization, and the `loo` package for model comparison. In addition to developing statistical software, Jonah is affiliated with several research centers at Columbia, including the Applied Statistics Center, the Institute of Social and Economic Policy and Research, and the Population Research Center, where he advises on statistical issues related to the collection and analysis of survey and demographic data. Outside of academia, Jonah has provided statistical consulting to professional sports teams, major publishing companies, and other businesses, as well as US and European Union government agencies.

Leonardo Egidi received his PhD in statistics from the University of Padova and is currently a Postdoctoral researcher in the Department of Economics, Business, Mathematics and Statistics, at the University of Trieste. His research in Bayesian statistics focuses on mixture modeling and applications of hierarchical modeling to football/soccer and betting markets.

**Cascina Cravino
Aula Informatizzata.
University of Pavia
Via Bassi 21
27100 Pavia (Italy)**

Registration Fees

Academic	€ 400,00
Student	€ 300,00
Non academic	€ 500,00

**Deadline for sending application
3 September 2018**

Secretary

Dr. Gianfranca Corbellini

dbbs.master@unipv.it

Dept. of Brain and Behavioral Sciences

Program

DAY 1: Foundations of Bayesian inference in theory and practice

- What is Bayesian inference?
- Generative models, prior, likelihood, posterior
- Advantages and disadvantages of Bayesian methods (comparisons with other approaches to inference)
- Bayesian data analysis workflow
- Introduction to computation with Markov Chain Monte Carlo (MCMC)
- Challenges of implementing MCMC in practice (i.e., why do we need Stan?)
- Introduction to Stan with simple examples

DAY 2: Bayesian applied regression models

- Bayesian perspective on linear and generalized linear models (GLMs)
- How to think about priors for GLMs
- Programming and fitting GLMs in Stan (using RStan, the R interface to Stan)
- Approaches to inference/prediction using GLMs
- Communicating results from regression models

DAY 3: Model checking, model comparison, and model selection/averaging

- Graphical and numerical model checking (posterior predictive checks)
- Comparing models based on different criteria
- Prediction vs explanation
- Model selection vs model averaging

DAY 4-5: Hierarchical/Multilevel modeling

- Theory of Bayesian hierarchical modeling, partial pooling
- Programming and fitting hierarchical models in Stan
- Understanding and diagnosing MCMC problems when fitting hierarchical models
- Using reparameterizations to solve computational problems when fitting hierarchical models
- If we have time we can cover more advanced topics like covariance with temporal and/or spatial structure

We will be using the **RStan interface** to Stan, which can be installed by following the instructions at <https://github.com/stan-dev/rstan/wiki/RStan-Getting-Started>

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REGISTRATION FORM

The registration form, completed in all its part, must be sent to the secretary by email at dbbs.master@unipv.it together with the proof of payment.

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Surname

Place and date of birth

Italian Fiscal Code

(ONLY FOR FOREIGN PEOPLE: attached copy of the passport for the invoice)

Company name

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VAT number

Address

City/Zip **State**

Phone **Fax**

Email

Institution

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Department

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Qualification

Under the GDPR, EU regulation 2016/679, the personal data will be processed by the University of Pavia, Via Bassi 21, Pavia.

REGISTRATION FEES

Academic	€ 400,00
Student	€ 300,00
Non academic	€ 500,00

The fees are VAT exempt, according to the Italian Law art. 10, DPR 633/72

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