

# Probabilistic Graphical Models

Course code: MLC\_PGM

This course is intended for people interested in Bayesian networks and probabilistic programming. At the beginning of the course, the theoretical part will lead to a practical example of topic modeling using Latent Dirichlet Allocation and its non-parametric extension, including hyperparameter estimation. By completing this course, the participants should be able to design and implement their own simple Bayesian networks for various problems.

## Who is the course for

This course is intended for people interested in Bayesian networks and probabilistic programming.

## Required skills

- basic knowledge of programming in Python
- high school level of mathematics

## Course outline

- Bayesian networks
- Model representation
- Generative vs. discriminative models
- Statistical inference in Bayesian networks
- Variational inference
- Sampling
- Rejection sampling
- Markov Chain Monte Carlo
- Metropolis-Hastings sampling
- Gibbs sampling
- Probability distributions
- Binomial and multinomial distributions
- Beta and Dirichlet distributions
- Gamma distribution
- Probabilistic programming languages
- Practical example with topic modeling
- Latent Semantic Analysis
- Probabilistic Latent Semantic Analysis
- Latent Dirichlet Allocation
- Non-Parametric topic modelling
- Dirichlet process
- Chinese restaurant process and Stick breaking process
- Non-parametric LDA
- Hyperparameter estimation

**GOPAS Praha**  
Kodařská 1441/46  
101 00 Praha 10  
Tel.: +420 234 064 900-3  
[info@gopas.cz](mailto:info@gopas.cz)

**GOPAS Brno**  
Nové sady 996/25  
602 00 Brno  
Tel.: +420 542 422 111  
[info@gopas.cz](mailto:info@gopas.cz)

**GOPAS Bratislava**  
Dr. Vladimíra Clementisa 10  
Bratislava, 821 02  
Tel.: +421 248 282 701-2  
[info@gopas.sk](mailto:info@gopas.sk)

 **GOPAS**®

Copyright © 2020 GOPAS, a.s.,  
All rights reserved