

Advanced Probabilistic Machine Learning and Applications 2021: general information

Caterina De Bacco

- **Logistics:**

- **Website:** https://github.com/APMLA-2021/APMLA-2021_material
- **Plan 2020/21:** 19 Apr 2021 - 31 Jul 2021, 14 weeks, 2+2 hr/week, 14 weeks, 56hr
- **Lecture-Free week:** 24-30 May 2021
- **Lecture:** Wednesdays 14:15-16pm online
- **Tutorial:** Thursdays 16:00-17.45pm online
- **Registration:** NEED to register the exam either via Campus / ALMA or written if the student cannot register online.

- **Grading:**

- 70% written exam
- 30% exercises from tutorials.

- **Feedback survey:** After every lecture, there will be a survey for the students to fill. The results will be summarized at the beginning of the next class.

- **Tentative program and schedule:**

1. Introduction to probabilistic machine learning → Tutorial: Written exercises *Reference:* Chapter 2 up to Section 2.3.6 and Section 8.2 of [Bishop \(2006\)](#)
2. Gaussian Mixture Model (GMM) + Expectation Maximization → Tutorial: Coding exercise *Reference:* Section 9.2 of [Bishop \(2006\)](#)
3. Bayesian Mixture Models + Gibbs Sampling → Tutorial: Coding exercise
4. Mean Field approach → Tutorial: Written exercises
5. TAP approximation → Tutorial: Written exercises
6. Belief Propagation and Bethe approximation I → Tutorial: Written exercises
7. Belief Propagation and Bethe approximation II → Tutorial: data science
8. Stochastic Block Model → Tutorial: data science
9. Poisson matrix factorization → Tutorial: data science
10. Probabilistic matrix factorization + recommender systems → Tutorial: data science
11. GMM + Variational Inference (VI) → Tutorial: Coding exercise
12. VI + LDA → Tutorial: data science
13. Stochastic VI → Tutorial: Coding exercise

References

C. M. Bishop, *Pattern recognition and machine learning* (Springer, 2006).