

Proposal for the elective course to be offered to doctoral students of UL

**Course Title:**

**Machine Learning and Artificial Intelligence**

**Summary:** This course is an introduction to data science for non-computer scientists. The course covers topics from data preparation, clustering, regression and classification, model evaluation, and embedding of unstructured data.

The University's Doctoral School will promote the course, and we expect enrollment from engineering, natural sciences, and humanities students. The course is not intended for computer science students or students whose curricula already include courses on machine learning or data science. This course has already been run in the 2023/24 academic year, when we trained about 20 dedicated students.

**Type of course:** lectures + homework assignments

**Course content:**

1. Visual programming and data analytics, focusing on data organization, visualization, and exploratory data analysis.
2. Cluster analysis techniques, including hierarchical clustering, k-means, silhouette scoring, and explanations of clusters.
3. Classification techniques, including evaluation of predictive accuracy and statistical comparison of methods such as logistic regression and random forests. Regression methods with emphasis on model scoring and evaluation and observation of effects of regularization.
4. Data projections and embedding, particularly PCA, multidimensional scaling, and the t-SNE method.
5. Analysis of unstructured data such as images and text, discussing embedding in vector spaces and deep models.

**Lecturers:** Blaž Zupan and Janez Demšar

**Semester:** Fall 2024

**Prerequisites:** no prior knowledge of the topics is assumed. This course will not use computer programming, and no prior statistics or data science knowledge is required.