



PhD School in Industrial and Information Engineering

Machine Learning for Engineers

Dr. Jhilik Bhattacharya, PhD

Associate Professor and Associate Head

Department of Computer Science and Engineering

Thapar Institute of Engineering and Technology, Patiala

The objective of this course is to familiarize an engineer with the artificial intelligent tools and frameworks available for solving an engineering problem.

The lecture series will be divided into four parts. The first part will include a general introduction to the field of machine learning, the role of engineers in it and will motivate the use of machine learning: a data-driven design methodology, as opposed to the conventional model-driven domain knowledge.

The second part will introduce the types of machine learning problems, data and evaluation approaches. The landscape of machine learning frameworks i.e. supervised, unsupervised, and reinforcement learning will be discussed along with data transformation and feature engineering.

The third part will delve into optimization for machine learning techniques and focus on gradient descent, stochastic gradient descent, backpropagation algorithms and their properties.

The final part will touch the model training, tuning and regularization techniques. A brief introduction to generative AI models, the transformer architecture and its application will also be provided.

At the end of this course, a student will be able to organize the data required to solve a problem, choose the correct model and framework in-order to solve an engineering application.

Dates and places:

- **01/04**, 14:00-16:00, Comprensorio Piazzale Europa, ed. C6, Aula piccola
- **02/04**, 11:15-13:15, Comprensorio Piazzale Europa, ed. C7, Aula B
- **08/04**, 14:00-16:00, Comprensorio Piazzale Europa, ed. C6, Aula piccola
- **09/04**, 11:15-13:15, Comprensorio Piazzale Europa, ed. D, Aula T_C

Note: For the hands-on part of the course, students are invited to bring their own notebook and have a Gmail account available.

Note: While in-person participation is strongly recommended, we have set up the MS Team with code fb9hyyp for those who can only join online.