

Third Hackathon on Machine Learning at INFN: *Advanced Level*

The third edition of the *Hackathon* dedicated to *Machine Learning* applications within the INFN research fields will be held in the **Physics Department of the University of Bari**, from **November 21st to November 24th 2022**. For the first time, the hackathon will be an *in-person* event.

The hackathon programme will include an overview of the **technological and infrastructural solutions** made available by INFN to develop and deploy novel techniques based on *Machine Learning*, a series of lectures on **modern *Machine Learning* techniques** including *Systems of Neural Networks*, *Graph Neural Networks* and *Transformers*, and seminars on frontier developments in ***Machine Learning* research**. Hands-on and tutored exercise sessions on INFN Cloud resources will complete the programme.

Most of the algorithms and implementations discussed during the hackathon will be backed with example **applications to real problems within the INFN research fields**, such as *High-Energy* and *Medical Physics*.

The event is targeted at postgraduate researchers with basic experience in *Machine Learning* and Deep Learning, but staff members, Ph.D. and Master students are also kindly encouraged to apply.

Affiliation to INFN is required for all participants.

The programme

The event is organized over four days, starting from the afternoon of the first day to the morning of the fourth.

The first afternoon will be devoted to the presentation of technological and infrastructural solutions to empower *Machine Learning* studies within INFN. The **INFN Cloud initiative** will be presented, with a focus on the two major Computing Centers federated to date: **CNAF** in Bologna and **ReCaS** in Bari. The most relevant software tools and techniques to enhance **Open Science on Cloud resources** will also be presented.

The second and the third mornings will be fully devoted to introducing, discussing and implementing advanced *Machine Learning* algorithms. Trainable algorithms composed of multiple *Neural Networks* to perform tasks beyond regression and classification will be presented. Modern *Machine Learning* algorithms including *Graph Neural Networks* and *Transformers* and their applications in fundamental research will be discussed.

During the afternoons, the participants will be split in small groups and will challenge themselves with exercises developing on the topics introduced during the lectures. A dedicated tutor will provide support to each group.

The fourth morning is reserved for seminars on ongoing and future developments in *Machine Learning* research.

Fees and enrollment

The mandatory registration process will be open from **Monday October 10th** to **Monday October 24th**.

In case of a number of registrations exceeding the available positions, the applications will be ranked and selected on the basis of the scientific CV of the applicants and of the information provided at the time of registration.

The successful applicant will be informed by **November 1st**.

A fee of 75 € will be requested to the selected participants to cover the expenses for the coffee-breaks.

Please note that the fee can only be paid as an internal transaction between INFN units.

During the registration process participants will be invited to rank the two afternoon exercises based on their interest. Preferences will be satisfied whenever possible, while forming groups with students covering the full range of proficiencies to encourage self-tutoring within the group.

Additional information

Participation is limited to 20 participants.

All participants are requested to attend the event in person, bringing their laptops.

Venue

INFN Sezione di Bari

Via Giovanni Amendola, 173, 70126 Bari BA

Participants are kindly requested to directly book their rooms in Bari.

Detailed information about the accomodation is available in the [Accomodation](#) page of the event website.

Website

<https://l.infn.it/mlinfn-3rd-hackathon> or <https://agenda.infn.it/event/32568/>