25th edition

Weather Meets Artificial Intelligence: Building Tomorrow's Earth Science

June, 15th - July, 5th 2025

International FBK Summer School for Data Science and AI-based interdisciplinary research

WebValley

webvalley.fbk.eu

WebValley 2025

WebValley is the International FBK Summer School for Data Science and AI-based interdisciplinary research. The school runs in a tech lab, set up at the Artigianelli high school, in downtown Trento. The WebValley Lab provides computing resources and devices to test new ways of exploring the principles of applied data science and predictive models. Students joining the school work in a lively and interactive environment together with a group of selected experts, also interacting through teleconference with other labs. Each year, the team includes students from Trentino, nationals and internationals. More than 460 students (17-19y old) have attended the WebValley School since its first edition in 2001, as true protagonists of a challenging research project. Fellowships are sponsored by FBK and partner organizations, covering tuition and accommodation, as well as computing and scientific resources. Families can be asked for a contribution for sports and social activities organized on weekends.

The requirements to participate:

- High School student
  (for Italy: 4th year completed)
- Good knowledge of English
- Enthusiasm for science and new technologies
- Above-average school records
- 1 Student's Motivation letter
- 1 Teacher's Recommendation letter
- 1 recorded video interview with the candidate answering 5 written questions

Applicants need to demonstrate their inquisitiveness, their interest in STEM domains and in the topic of the year, and their programming skills (if present). In addition, aptitude for teamwork is a crucial requirement to participate. Candidates are scored both for their background knowledge and their motivation to contribute to the project.

The 2025 Challenge

In 2025, the team of about 20 students, collaborating with researchers from the Bruno Kessler Foundation (FBK), will join the Artificial Intelligence weather revolution, which is reinventing Weather and Climate research all over the world. Using machine learning techniques, participants will develop and explore models ranging from short-term weather predictions to climate scenarios, leveraging data from ground stations, satellites and multi-decadal global climate archives. Experts from local and national weather agencies, international research institutions, and private companies will join our journey in teaching lessons and supporting the Webvalley team in tackling diverse challenges that will be explored in the three weeks of the school program.

As part of this immersive experience, students will be actively engaged in assembling a comprehensive analysis framework, improving their skills in handling earth-system data, and gaining hands-on experience with state-of-the-art AI technology.
Throughout the project evolution the participants will develop technical skills in data science, acquiring working experience on machine learning, including reproducibility and interpretability for AI solutions, and the basics of deploying models on the cloud.

The goals of WebValley 2025

- Encourage smart students to be entrepreneurs in science
- Leverage interdisciplinarity
- Develop teamwork, collaboration, fast-prototyping attitudes
- Expose to challenging research themes of strong ethical interest
- Use high quality data from scientific and public institutions
- Gain experience about the hardware and data
- Promote the adoption of standard formats and share data policies
- Deduce innovative, efficient, and effective education and communication models to be reproduced within the Italian and, potentially, the European school system

The format

In the first week, introductory courses in data science, visualization and AI (e.g. Python and machine learning) software are provided to the whole team, with an emphasis on the specific domain of the project (e.g. biomedicine, digital agriculture, physics, etc.). Such initial concentration efforts provide a large spectrum of tools among which the participants can choose the most proper ones for developing the research project, including programming languages and AI frameworks such as Keras/TensorFlow and PyTorch for deep learning.

The second stage of the experience (2nd and 3rd week) outlines a learning environment which is intentionally shaped, where the participants have the chance to work independently on the research project, typically divided in smaller groups that are formed on the basis of the students' personal interests and the specific tasks required to tackle the challenge. The teamwork sessions will be marked by interactive experiences designed with a specific methodology that aims to develop fundamental problem solving skills while setting the goals of the challenge, and to increase the quality of the cooperation among the teams.

Lab is open all day, but group activities and leisure time are also part of the three weeks course.

Project keywords

- Data Science & Tools
- Unix + GitHub
- Python intro
- Numpy & Scipy & Pandas & Pyplot
- Data Visualization
- DL theory, apps & implementations
- The AI revolution in weather forecasting
- Weather and Climate data
- Nowcasting and Downscaling with AI models
- Novel approaches to improve climate simulations
- Project Data
- Meetings and brainstorming sessions

Special Event

Friday, July 4th 2025

Final presentation of project results

Organized by

FONDAZIONE BRUNO KESSLER

DSH DATA SCIENCE FOR HEALTH

DSIP DATA SCIENCE FOR INDUSTRY & PHYSICS

In collaboration with

ARTIGIANELLI

REGENERON ISEF

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Colégio DANTE ALIGHIERI

Endorsed by

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