# Multidisciplinary Online Training Program in Spring 2027 on AI + High Performance Computing + Atmospheric Sciences

## Information and apply by 01/04/2027 at https://cybertraining.umbc.edu

*Introduction*

CyberTraining at UMBC is an NSF-funded cross-training program for graduate students and early career researchers in data science and atmospheric science to foster interdisciplinary "**AI + HPC + Atmospheric Science**" research and education using advanced cyberinfrastructure (CI) resources and techniques. The training consists of instruction in the areas of data, computing, and atmospheric sciences supported by teaching assistants, followed by faculty-guided project research in a multidisciplinary team of participants from each area. Participating **graduate students, post-docs, and junior scientists/faculty** from around the nation will be exposed to multidisciplinary research experiences and have the opportunity for significant career growth. **Each participant will receive a $500 stipend** after completing the training.

The program follows a similar structure of a successful online research training in 2018-2020 funded by the same NSF CyberTraining program. Detailed information can be found at https://cybertraining.umbc.edu/cybertraining-2018-20.

*Training program syllabus*

| Module | Topic | Goal |
|---|---|---|
| 1 | Introduction of Data Science | Basic concepts of data science |
| 2 | Basics of machine and deep learning | Main types of machine learning, and uncertainties in data and AI models |
| 3 | Basics of earth-atmosphere radiative energy balance | Introduction of radiative energy balance of the earth-atmosphere system, and its implications to the circulation system |
| 4 | Basics of radiative transfer simulation framework | Principles that control the transport of radiation in the Earth's atmosphere |
| 5 | Remote sensing | Remote sensing theory in optical and infrared spectral ranges. |
| 6 | Reproducible deep learning | Techniques for building fully reproducible machine learning workflows |
| 7 | Scalable deep learning | Scalable deep learning for large models and datasets |
| 8 | Leveraging national research CI for scalability & reproducibility | Able to access national research cyberinfrastructure |
| 9 | Physics-guided machine learning | Approaches for physics-guided machine learning |
| 10 | Project introduction and assignment | Project explanation from each team, including Q&A |
| 11-14 | Project progress report from each team and feedback from instructors | Report from each team including Q&A + rating |
| 15 | Final project presentation | Report, software, and final presentation from each team |

*Online training structure*

The training will adopt a flipped classroom approach for the instruction in modules 1-9. Participants watch the lecture videos individually first, then work on homework as a team. Help is available at all stages from instructors and TAs. During modules 10-15, each team will present their research progress online and get feedback. Participants, instructors, and TAs communicate online weekly on Fridays from 2:00 to 4:00 PM ET. Each participant is expected to spend 9-12 hours per week on the training.

*Who should participate*

- Students/researchers interested in interdisciplinary research and how AI and HPC techniques can be applied to Computational Physics and other Computational Sciences.
- Graduate students and post-doctoral researchers / junior faculty who want to participate in project-based multidisciplinary research to further their career.

*Ideal prerequisite knowledge for different majors*

| Major | *Ideal Prior Expertise* |
|---|---|
| Data/Computing | Programming (Python), Data Science & AI, Distributed Systems |
| Atmospheric Science/Physics | Computational Physics, Thermodynamics, Electromagnetism, Radiation |

*Instructors*

- Dr. Jianwu Wang, Department of Information Systems
- Dr. Pengwang Zhai, Department of Physics
- Mr. Roy Prouty, Division of Information Technology

*How to apply for Spring 2027 training (01/2027 - 05/2027)*

There is no fee to apply to the training program. **Each participant who successfully finishes the program and completes all requirements will receive a $500 stipend.** We expect to have 16 participants in 4 multidisciplinary teams of four, two participants from each discipline. Due to the capacity limit, there will be a selection process.

The applicant should be a graduate student, post-doc, or junior scientist/faculty in a US institution during the training period. The application package should include 1) applicant's CV, 2) personal statement, 3) transcripts for current students, and 4) two letters of recommendation. The personal statement needs to address specifically why the participant is interested in interdisciplinary research, related background, how participation will promote his/her career goals, and how he/she can contribute to a team of participants from each discipline. Directly apply via https://forms.gle/XtnrJwxGQt3RqVbw8.

*Important dates*

- Application deadline: Monday, 01/04/2027
- Notification: Monday, 01/18/2027
- Start date of the training: Monday, 01/25/2027
- End date: Friday, 05/14/2027

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