



UMBC

Online Training in Team-Based Multidisciplinary Research on Big Data + High-Performance Computing + Atmospheric Sciences

NSF CyberTraining Initiative on Big Data and HPC at UMBC cybertraining.umbc.edu

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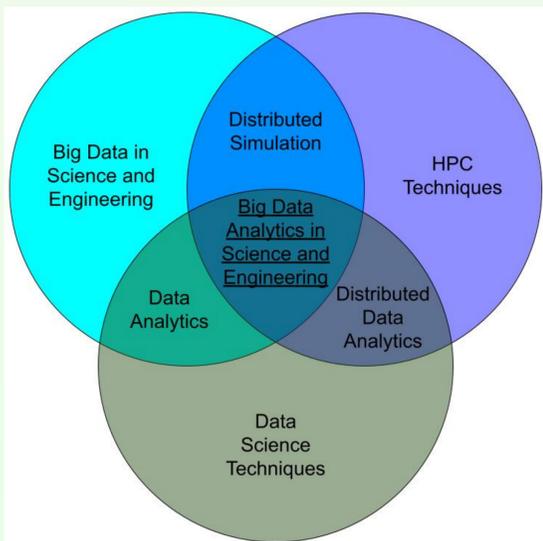
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UMBC CyberTraining

The UMBC CyberTraining initiative is a nationwide online training program at the advanced graduate level for cross-training of participants from multiple disciplines in Big Data applied to Atmospheric Sciences as application area and using High-Performance Computing as indispensable tool.

The training consists of instruction in all three areas, followed by faculty-guided research projects. The participating graduate students, post-docs, and junior faculty come from the three disciplines of IT, HPC, and Physics.



REU Site on Big Data + HPC

In Summers 2021, 2022, 2023
BigDataREU.umbc.edu

Flipped Classroom Model

Flipped classroom educational model for online instruction:

- Taped lectures that each participant views asynchronously
- Asynchronous communication via an online discussion forum
- Team based communication on homework
- Weekly synchronous homework presentation and discussion

Transition to Online Teaching

- We used face-to-face instruction in Year 1 to make the transition.
- Tools like Panopto and Blackboard Collaborate exist to self-tape lectures, namely screen capture with voice-over; closed captioning is available.
- Thus, transition feasible as part of a face-to-face class or in "studio" at home office.

hpcf.umbc.edu/publications

- [1] Wang, Gobbert, et al., EduHPC-17 at SC 17.
- [2] Wang, Gobbert, et al., FECS'20 at CSCE 2020.

Details of our Flipped Classroom

- Goal is to use valuable synchronous class time for student engagement!
- One more step beyond "flipped classroom": Teams work on homework asynchronously during week, then the synchronous class time is used for homework presentations!
- This yields interaction between teams, exposure to other teams' solutions, and experience with online tools for all participants.
- All this experience is valuable during the research portion of the training!

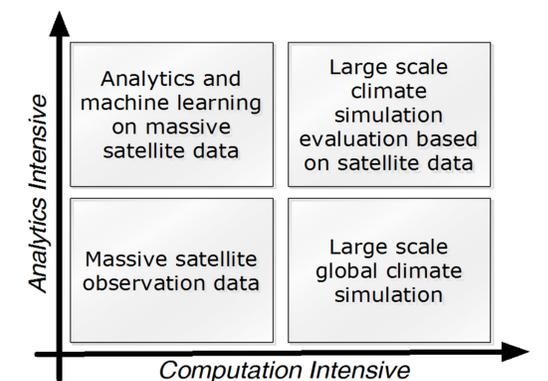
Participant Profile

	Undergr.	Grad	Post-doc	Faculty	Total
Year 1	0	9	4	3	16
Year 2	0	14	2	1	17
Year 3	6	11	4	4	25
Total	6	34	10	8	58

- Applicants in Year 1: 18 locally (for F2F on Friday afternoons);
- Applicants in Years 2 and 3: 94 and 100, resp., nationwide.

CyberTraining Details

The training is organized in 15 weekly modules, with the first 10 covering the instruction in all three areas of big data, HPC, and atmospheric physics, and the final 5 for the research projects. All activities are conducted in multidisciplinary teams with participants from each area. The participants come from the entire nation and all activities are conducted online with weekly teleconferences for homework and project presentations by all teams. Each team submits a technical report and an extended presentation.



Acknowledgments

- NSF CyberTraining initiative for programs in 2018, 2019, 2020
- NSF MRI, UMBC, HPCF, CIRC
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