SciFM Summer School

July 8 - 26, 2024, 9 am - 5 pm
Ann Arbor, MI

Agenda (all times ET)

SciFM24
Summer School

MICDE

Week 1

Monday, July 8

10:00 am	Welcome & Opening Remarks - **Karthik Duraisamy** (UM)
10:10 am	Summer School Goals - **Venkat Viswanathan** (UM)
10:30 am	Keynote: Foundation Models for Science - **Ian Foster** (ANL)
12:00 pm	Open Discussion

Progress in Domain-specific Foundation Models
1:30 pm	Agents for Materials Discovery- **Jan Jansen** (Max Planck)
2:15 pm	Learning the Language of Chemistry - **Philippe Schwaller** (EPFL)
3:15 pm	Foundation Models for Drug Discovery - **Bharath Ramsundar** (Deep Forest Sciences)
4:00 pm	Foundation Models for Climate - **Aditya Grover** (UCLA)

Tuesday, July 9

Foundation Models Programs @ DARPA
10:00 am	Overview - **Erica Briscoe** (DARPA)
10:20 am	Materials Synthesis - **Jia Deng** (Princeton)
10:40 am	Robot scientist - **Boyuan Chen** (Duke)
11:00 am	Measuring Creativity - **Lav Varshney** (UIUC)
11:20 am	Dynamic Multi-agent systems - **Wei Wang** (UCLA)
11:40 am	Hypothesis generation in Climate Science - **Rose Yu** (UCSD)

Visioning Session (Closed group)
1:30 pm	Existing structures and institutes (discussion)
2:00 pm	Vision & SciFM Institute: Proposed Structure
2:30 pm	SciFM25 & Beyond : Future Conferences & Community building Working Breakout Session: Prompt: Produce a blueprint for SciFM Institute: Resources, Personnel, Structure

Wednesday, July 10

Tutorial 1

9:00 am   Aurora: Foundation Model for the Atmosphere - **Paris Perdikaris** (Microsoft/UPenn)

11:00 am   PDE Foundation Models - **Maximilian Herde** (ETH)

1:30 pm   **Hackathon details and logistics**

2:00 pm   ### Tutorial 2
Data & Tokenization
Sequence data: Omics + Molecular (SMILES, SELFIES) - ANL Team
Tokenization - ANL + UM Team
Discussion of Practical issues

Thursday, July 11

Tutorial 3

9:30 am   **Training Models**
Training Infrastructure for Biological Sequence Models - **ANL Team**
Neural operators + other PDE architectures - **Caltech Team**
Vision Transformers & Foundation Models **- Deep Forest Sciences**

1:30 pm   **Diffusion Models for PDEs - Tony Zhuang** (UM)

3:00 pm   **Scaling Laws (Discussion)**
Overview of Scaling Laws - **Alex Wadell** (UM)
Scaling sequence models + compute optimal scaling
Vision scaling laws
Scaling laws of FNO, PDE

Friday, July 12

Tutorial 4

9:30 am   Retrieval Augmented Generation - Ozan Gokdemir (ANL)

11:00 am   **Agents: Part 1 (Biology)** - ANL Team

1:30 pm   **Agents: Part 2 (Chemistry)** - ANL Team
External tooling, experimental data, Fine-tuning, preference:

3:00 pm   LLMs and Autonomous Agents in Chemistry

4:00 pm   Hackathon -Final team selection and goal setting for Hackathon

Week 2

Monday, July 15 & Tuesday July 16

Hackathon

Wednesday, July 17

Tutorial
AI Accelerators
9:30 Welcome & Goals
9:45 Cerebras
10:15 Sambanova
11:00 Graphcore
11:30 Groq
1:00 NVIDIA
1:30 Hands on session
3:15 Discussion

Thursday, July 18 & Friday, July 19

Tutorial
Federated Learning - **Ravi Madduri** (ANL)
Hackathon

Week 3

Monday, July 22 & Tuesday, July 23 & Wednesday, July 24

Hackathon

Thursday, July 25

Hackathon teams presentation (industry present)
Materials
Biology
Agents
PDEs

Outlook for AI-assisted science in non-research settings

Friday, July 26

Open questions for Foundation Models for Science
Panel: Security, Equity, Safety
Ecosystem Gathering (University, Lab, DoD, Venture, Philanthropy)
Next steps and Closing discussion