

Summary:

This will be a project-based group focused on **scientific machine learning**. While my current interests are primarily in continuum mechanics and creating machine learning surrogates for PDE solvers, the group can go in different directions. Many avenues appear in the pipeline of cardiac mechanics. We can also explore scientific machine learning uses in systems of nonlinear ODEs, creating meshes from MRI/scan data, influence of geometry on PDE solutions, etc... We can also read papers near the beginning to explore the avenues and settle on a topic, but I think you'd get the most out of this by making something yourself.

**Video showing heart modeling:**

[https://www.youtube.com/watch?v=yQhXj8dfZ\\_A](https://www.youtube.com/watch?v=yQhXj8dfZ_A)

**Scientific Machine Learning Papers to Possibly go through**

ML for continuum mechanics:

<https://www.sciencedirect.com/science/article/pii/S0997753819305352>

ML for material models:

<https://www.sciencedirect.com/science/article/pii/S0045782522001724>

Neural Network Finite Element:

<https://www.sciencedirect.com/science/article/pii/S0045782524003165>

NNs for contact:

<https://www.sciencedirect.com/science/article/pii/S0045782523007946>

Operator Learning:

<https://arxiv.org/pdf/2402.15715>

Geometric Operator Learning:

[https://proceedings.neurips.cc/paper\\_files/paper/2023/file/70518ea42831f02afc3a2828993935ad-Paper-Conference.pdf](https://proceedings.neurips.cc/paper_files/paper/2023/file/70518ea42831f02afc3a2828993935ad-Paper-Conference.pdf)