

**APMA 2070/ENGN 2912 Deep Learning for Scientists and Engineers
Course Projects
Spring 2023**

Biomedicine

1. Solving forward and inverse problems in mathematical modeling of blood coagulation
2. Predicting drug absorption using a Physics-Informed Neural Network
3. Parameter identification in glucose-insulin interaction
4. Parameter Estimation in thrombus formation

Dynamical Systems

5. Charged particle in a electromagnetic field
6. Learning dynamical systems from data
7. Stiff ODE systems

Engine Dynamics

8. Learning engine parameters

Fluid Mechanics

9. Compute and benchmark the solution of Boussinesq Equation using different activation functions
10. Modeling bubble growth dynamics

11. Reconstruction of flow past a cylinder
12. Reconstruction of flow field for a lid driven cavity flow
13. Solving forward and inverse problems in mathematical modeling of wave propagation

Geophysics

14. Reaction-diffusion system in porous media
15. Estimating sea surface temperature using multi-fidelity neural networks
16. Microseismic hypocenter localization using PINNs

Heat Transfer

17. Inverse heat transfer problem
18. Steady state non-linear inverse heat conduction problem
19. Heat conduction in double layered structures exposed to ultra-short pulsed laser
20. Benchmarking Finite-difference vs Automatic-Differentiation for steady-state PDEs

Materials

21. Inverse problem on modulus identification of hyperelastic material
22. Characterizing surface breaking crack using ultrasound data and PINNs