

Mathematical Physiology
Possible Special Topic choices

- Models of calcium-induced calcium release/muscle action
- Models of action potentials in the heart
- Oscillations and/or chaos in delay differential equations
- Respiratory arrhythmias
- Cardiac arrhythmias
- Blood cell diseases
- Chemical/biological waves in two or three dimensions
- Regulation of acid-base balance
- Neurotransmitters and brain function
- How poisons work
- Neural networks
- Mathematics of the digestive system
(<https://aip.scitation.org/doi/full/10.1063/5.0096877>)
- Machine learning for the Hodgkin–Huxley equations
(<https://www.biorxiv.org/content/10.1101/2023.04.17.537224v1.abstract>)

Other more speculative projects:

- Mathematics of brain stimulation
- How do proton pump inhibitors (PPIs) work?
- How do opiates work?
- How do anti-depressants work?
- ADHD
- Pacemakers and heart function
- Mathematics of meditation
- Mathematics of addiction and dopamine