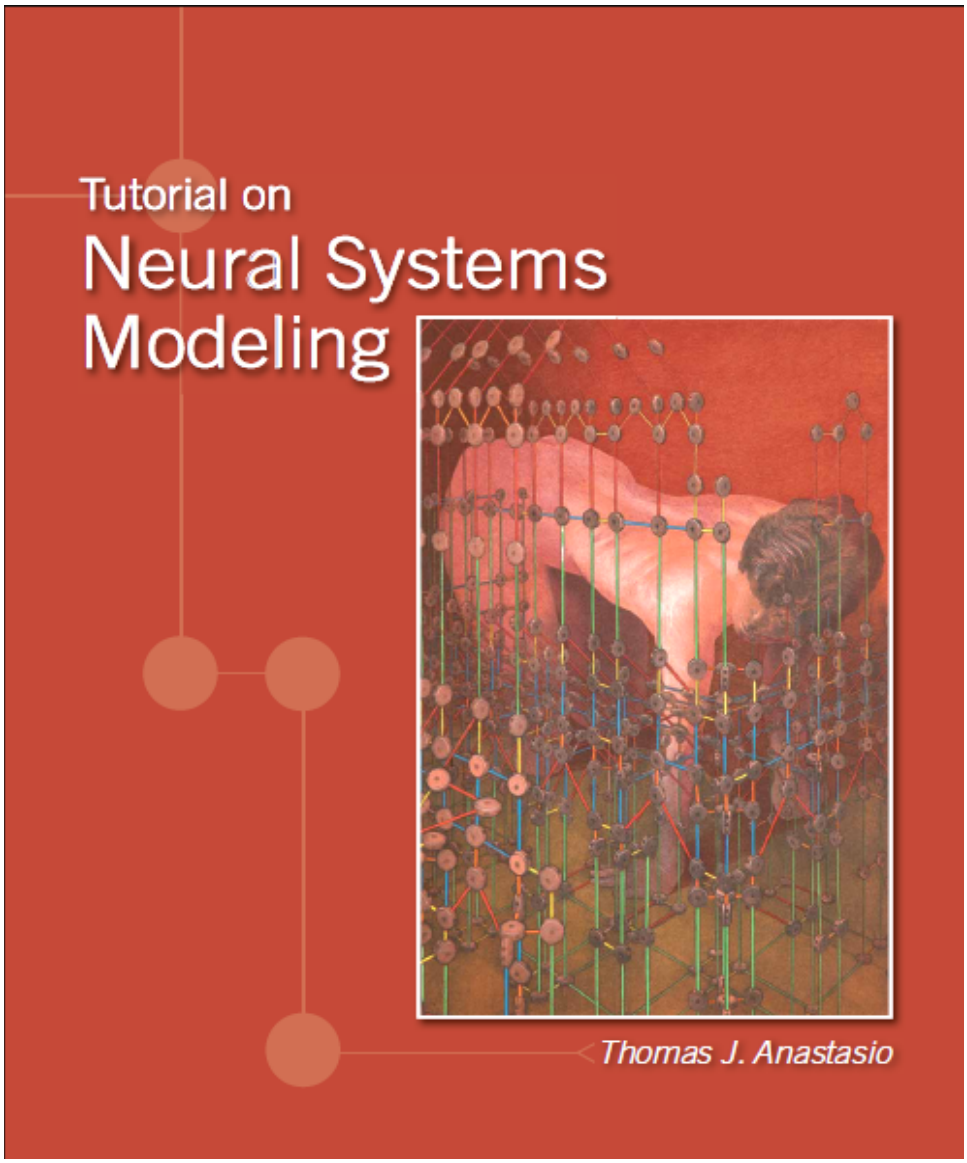
The function of the brain is incredibly complex.

Computer simulation is one way to begin to understand brain function.

If you are interested in an independent study on computational neuroscience, then enroll in:

MCB 493 section TJA: Neural Systems Modeling



Neural Systems Modeling

An independent study course in using computers to model the nervous system

Each week students will learn to use a new modeling paradigm, and will learn the relevance of that paradigm for understanding real neural systems. Students will work on their own from a tutorial-style textbook, and will meet with the instructor once weekly to work out programming details and to discuss the implications of the simulations.

Instructor: Thomas J. Anastasio
Associate Professor of Molecular and Integrative Physiology
email: tja@illinois.edu

Required text:

title:	Tutorial on Neural Systems Modeling
author:	Thomas J. Anastasio
publisher:	Sinauer Associates
pub year:	2010

Meeting times: Wednesday 3:30-4:30pm

Meeting location: depends on enrollment and will be announced

Work required: Completion of weekly computer programming assignments and submission of write-ups for each assignment

Grading method: Straight letter grade (A, B, C, D, F).

Class policy: Homeworks are assigned each Monday and are due the following Monday by midnight. Late write-ups will not be accepted.

Background: MCB 314 (Intro to Neurobiology), CS 110 (Programming Lab), Math 124 (Finite Math), or equivalents, or concent of instructor.

Topics covered:

1. Overview of neural systems and computer modeling
2. Abstract neuron models and simple neural circuits
3. Feed-forward and recurrent lateral inhibition
4. Covariance learning and Hopfield networks
5. Unsupervised learning and self-organizing maps
6. Supervised learning and back-propagation
7. Reinforcement learning and associative conditioning
8. Informational capacity of neural networks
9. Estimation of probabilities by neural networks
10. Recurrent back-propagation and time series learning
11. Sequential decisions and temporal difference learning
12. Predictor-corrector networks and temporal inference
13. Genetic algorithms and neural networks
14. Review and case studies