COSC 494 / 594 — Computational Cognitive Neuroscience

Student Learning Outcomes

Students will:

- Understand differences between different types of neural models.
- Understand membrane potential and generation of action potential.
- Understand neurons as pattern matchers.
- Understand interaction of neurons in networks.
- Understand learning and adaptive mechanisms (LTP, LTD, STDP, XCAL, etc.).
- Explore effects of parameters on learning.
- Be able to locate anatomical brain regions and discuss functions.
- Understand large-scale organization of perceptual systems.
- Understand self-organization in perceptual systems.
- Explore effects of lesions on attention.
- Understand mechanisms of reinforcement learning (dopamine, basal ganglia, temporal difference, PVLV, etc.).
- Understand differences between learning and dynamics in various brain regions (attractor, separator, integrative).
- Model error-driven learning (cerebellum).
- Understand mechanisms of short-term, episodic, procedural, and semantic memory. Understand basic mechanisms of language.
- Understand executive function, reinforcement, and planning.
- Be able to use *emergent* simulator to run experiments.
- Be able to modify *emergent* simulations to test new hypotheses.

ABET Student Outcomes Addressed by this Course

Course Outcomes ↓	Computing Accreditation Commission Statement of Student Outcomes										
	a	b	c	d	e	f	g	h	i	j	k
Cognitive modeling	X	X								X	X	
Neurons & networks	X										X	
Learning & adaptation	X										X	
Perception & attention												
Motor control & reinforcement											X	
Learning & memory											X	
Language												
Executive function												