

School of Mathematical Sciences

B12412: Computational Neuroscience and Neuroinformatics

Lecturer: Prof S Coombes (Pope B18)

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Education Aims: To provide understanding in the use and development of computer models to simulate neuronal behaviour from the level of the single neuron to that of neuronal networks.

Learning Outcomes: To demonstrate and use computer models to investigate and simulate properties of neuronal behaviour from the level of the single neuron to that of neuronal networks.

Contents of course

- Lectures
 - Module overview & assessment.
 - Neuroinformatics.
 - Why use models? Models as tool - success and failure.
 - Examples of models & packages I: The action potential (Neurons in Action demo).
 - Examples of models & packages II: Dendrites (NEURON demo - pyramidal cell).
- Workshops
 - Workshop 1 - Introduction to NEURON & Posters.
 - Workshop 2 - Single neurone.
 - Workshop 3 - Single synapse.
 - Workshop 4 - Small networks.

Course web page

http://www.maths.nott.ac.uk/personal/sc/cnn/

Suggested books

1. John W. Moore and Ann E. Stuart (2007) Neurons in action: tutorials and simulations using NEURON (ver. 2.0), Sinauer.
2. N. T. Carnevale NT & M. L. Hines. (2006). The NEURON Book, Cambridge University Press.
3. Wilson, H. (1999). Spikes, Decisions, and Actions: The Dynamical Foundations of Neuroscience, Oxford University Press.

Online Resources

Neurons in Action:

- Neurons in Action main page
<http://neuronsinaction.com/home/main>

NEURON:

- NEURON main page
<http://www.neuron.yale.edu/neuron/>
- NEURON tutorial
<http://www.anc.ed.ac.uk/school/neuron/>
- ModelDB (an archive of published models that are ready to run):
<http://senselab.med.yale.edu/senselab/modeldb/>