

# Australian Course in Advanced Neuroscience

23 April – 13 May April 2006 • Moreton Bay Research Station • North Stradbroke Island

## Programme

### TOPIC 1: NEURAL INTEGRATION & EXCITABILITY

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#### Sunday 23 April

5.00 pm	Welcome
5.30 pm	Safety induction <i>Kevin Townsend, Manager of Moreton Bay Research Station</i>
6.30 pm	Welcome Dinner

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#### Monday 24 April

#### Biophysics & Methods

9.00 – 10.30 am	Introduction Basic membrane biology and circuit analysis <i>Alan Finkel, Finkel Foundation</i>
11.00 am – 12.30 pm	Principles of electrophysiological recording <i>Greg Stuart, John Curtin School of Medical Research</i>
1.30 pm Laboratory Session	Familiarisation with equipment and software

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#### Tuesday 25 April

#### Ion channels

9.00 – 10.30 am	Introduction to ion channel diversity <i>Joe Lynch, University of Queensland</i>
11.00 am – 12.30 pm Laboratory Session	Brain slice preparation
1.30 pm Laboratory Session	Basics of patch clamping

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**Wednesday 26 April****Action potentials**

9.00 – 10.30 am

The Hodgkin-Huxley action potential

*John Bekkers, John Curtin School of Medical Research*

11.00 am – 12.30 pm

Design of voltage clamp/current clamp protocols

*John Bekkers, John Curtin School of Medical Research**Greg Stuart, John Curtin School of Medical Research*

1.30 pm

Laboratory Session

Practice patch clamping

Design and application of pulse protocols

Whole-cell current clamp recording from brain slices

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**Thursday 27 April****Gating & cable theory**

9.00 - 10.30 am

Mechanisms of channel gating

*Meyer Jackson, University of Wisconsin, Madison*

11.00 am – 12.30 pm

Cable theory and excitability in dendrites

*Steve Redman, John Curtin School of Medical Research*

1.30 pm

Laboratory Session

Practice patch clamping

Whole-cell current and voltage clamp

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**Friday 28 April****Channel structure-function**

9.00 – 10.30 am

Molecular approaches to channel structure/function

*Joe Lynch, University of Queensland*

11.00 am – 12.30 pm

*Hot Topic: Neuronal stem cells**Brent Reynolds, University of Queensland*

1.30 pm

Laboratory Session

Voltage clamp and cell-free patches

Single-channel recording

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**Saturday 29 April****Modulation of excitability**

9.00 – 10.30 am

Modulation of ion channels

*Pankaj Sah, University of Queensland*

11.00 am – 12.30 pm

Student research project talks

1.30 – 3 pm

Student research project talks

3 pm

Laboratory Session

Modulation of action potential firing

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**Sunday 30 April**

Free day

## TOPIC 2: SYNAPTIC TRANSMISSION

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### Monday 1 May

### Fundamentals of synaptic transmission

- 9.00 – 10.30 am Introduction to the physiology of synaptic transmission  
*Christian Stricker, ANU Medical School*
- 11.00 am – 12.30 pm Cell and molecular biology of transmitter release  
*Meyer Jackson, University of Wisconsin, Madison*
- 1.30 pm EPSCs and minis in hippocampus  
Laboratory Session Quantal properties of EPSCs
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### Tuesday 2 May

### Ligand-gated ion channels

- 9.00 – 10.30 am Excitatory and inhibitory transmission  
*Christian Stricker, ANU Medical School*
- 11.00 am – 12.30 pm Receptor and neurotransmitter dynamics  
*John Clements, Prince of Wales Medical Research Institute*
- 1.30 pm Pharmacology of EPSCs and IPSCs  
Laboratory Session IV plots
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### Wednesday 3 May

### Modulation of synaptic transmission

- 9.00 – 10.30 am Short-term synaptic plasticity  
*Massimo Scanziani, University of California, San Diego*
- 11.00 am – 12.30 pm Data analysis: theory and software  
*Greg Stuart, John Curtin School of Medical Research*  
*John Clements, Prince of Wales Medical Research Institute*
- 1.30 pm Short-term synaptic dynamics of EPSCs  
Laboratory Session Presynaptic modulators
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### Thursday 4 May

### Long-term plasticity

- 9.00 - 10.30 am Long term potentiation  
Long term depression  
*Clarke Raymond, John Curtin School of Medical Research*
- 11.00 am – 12.30 pm Learning & memory  
*Cliff Abraham, University of Otago, Dunedin*
- 1.30 pm Hippocampal long-term potentiation  
Laboratory Session
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**Friday 5 May****Synaptic integration and networks**

9.00 – 10.30 am

Synaptic integration  
*Michael Häusser, University College London*

11.00 am – 12.30 pm

Neuronal networks  
*Massimo Scanziani, University of California, San Diego*1.30 pm  
Laboratory SessionDendritic recordings, pair recordings  
Recordings from interneurons

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**Saturday 6 May****Computational neuroscience**

9.00 – 10.30 am

Introduction to computational neuroscience  
*Michael Häusser, University College London*

11.00 am – 12.30 pm

*Hot Topic:* Contributions of human neuroimaging and neurodisruption to understanding the link between brain and cognition  
*Jason Mattingley, University of Melbourne*

Free afternoon

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**Sunday 7 May**

Free day

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**TOPIC 3: FLUORESCENCE IMAGING**

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**Monday 8 May****Fluorescence imaging I**

9.00 – 10.30 am

Introduction to fluorescence microscopy  
*Helmut Koester, University of Texas, Austin*

11.00 am – 12.30 pm

Theory and practice of calcium imaging  
*Bill Ross, New York Medical College*1.30 pm  
Laboratory Session

Calcium imaging in brain slices

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**Tuesday 9 May****Fluorescence imaging II**

9.00 – 10.30 am

Calcium dynamics in neurons  
*Bill Ross, New York Medical College*

11.00 am – 12.30 pm

Advanced techniques in fluorescence microscopy  
*Helmut Koester, University of Texas, Austin*

1.30 pm

Laboratory Session

Calcium imaging in brain slices

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**Wednesday 10 May**

9.00 – 10.30 am

Rhythmicity in the nervous system  
*David Hirst, John Curtin School of Medical Research*

11.00 am – 12.30 pm

An introduction to the NEURON simulation program  
*John Bekkers & Steve Redman,  
John Curtin School of Medical Research*

1.30 pm

Laboratory Session

Laboratory project

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**Thursday 11 May****Visual and autonomic neuroscience**

9.00 - 10.30 am

Visual neuroscience  
*Paul Martin, National Vision Research Institute*

11.00 am – 12.30 pm

The autonomic nervous system  
*Ian Gibbins, Flinders University*

1.30 pm

Laboratory Session

Laboratory project

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**Friday 12 May**

9.00 – 10.30 am

*Hot Topic: Neurodegeneration*  
*Mal Horne, University of Melbourne*

11.00 am – 5.30 pm

Laboratory project analysis and presentations

Closing Dinner

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**Saturday 13 May**

Farewell and Departure