

# Australian Course in Advanced Neuroscience

15 April – 5 May 2007 • Moreton Bay Research Station • North Stradbroke Island

## Program

### WEEK 1: NEURAL INTEGRATION & EXCITABILITY

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#### Sunday 15 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 16 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 17 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 – 6.30 pm Laboratory Session	Basics of patch clamping
8.00 – 9.30 pm	Student talks about their own research (6 students, 10 min talk, 5 min questions)

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**Wednesday 18 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

Introduction to data analysis

*John Clements, UNSW & Axograph Scientific*

1.30 pm

Laboratory Session

Protocol design

Practice patch clamping

Whole-cell current clamp recording from brain slices

8.00 – 9.30 pm

Student talks about their own research

(6 students, 10 min talk, 5 min questions)

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**Thursday 19 April****Gating & cable theory**

9.00 - 10.30 am

Mechanisms of channel gating

*Sarah Lummis, University of Cambridge*

11.00 am – 12.30 pm

Cable theory and excitability in dendrites

*Stephen 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 20 April****Channel structure-function**

9.00 – 10.30 am

Molecular approaches to channel structure/function

*Henry Lester, California Institute of Technology*

11.00 am – 7.00 pm

Laboratory Session

Voltage clamp

Cell-free patches

8.00 – 9.00 pm

Hot Topic Talk: Exciting ion channels in addiction

*Mac Christie, University of Sydney*

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**Saturday 21 April****Modulation of excitability**

9.00 – 10.30 am

Modulation of ion channels

*Pankaj Sah, University of Queensland*

11.00 am – 12.30 pm

Debriefing on Week 1

Data analysis tutorial

1.30 pm

Laboratory Session

Modulation of action potential firing

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**Sunday 22 April**

Free day

## WEEK 2: SYNAPTIC TRANSMISSION

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### Monday 23 April

### Fundamentals of synaptic transmission

9.00 – 10.30 am	Introduction to the physiology of synaptic transmission <i>Sharon Oleskevich, Garvan Institute, Sydney</i>
11.00 am – 12.30 pm	Cell and molecular biology of transmitter release <i>Yukiko Goda, University College London</i>
1.30 pm Laboratory Session	EPSCs and minis in hippocampus Quantal properties of EPSCs

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### Tuesday 24 April

### Ligand-gated ion channels

9.00 – 10.30 am	Excitatory and inhibitory transmission <i>David McCormick, Yale University</i>
11.00 am – 12.30 pm	Receptor and neurotransmitter dynamics <i>John Clements, UNSW &amp; Axograph Scientific</i>
1.30 pm Laboratory Session	Pharmacology of EPSCs and IPSCs IV plots

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### Wednesday 25 April

### Modulation of synaptic transmission

9.00 – 10.30 am	Short-term synaptic plasticity <i>Shaul Hestrin, Stanford University</i>
11.00 am – 12.30 pm	Synaptic integration <i>David McCormick, Yale University</i>
1.30 pm Laboratory Session	Short-term synaptic dynamics of EPSCs Presynaptic modulators

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### Thursday 26 April

### Long-term plasticity

9.00 - 10.30 am	Long term potentiation Long term depression <i>Clarke Raymond, John Curtin School of Medical Research</i>
11.00 am – 12.30 pm	Learning & memory <i>Cliff Abraham, University of Otago, Dunedin, NZ</i>
1.30 pm Laboratory Session	Hippocampal long-term potentiation

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**Friday 27 April**                      **Synaptic integration and networks**

9.00 – 10.30 am                      Neuronal networks  
*Shaul Hestrin, Stanford University*

11.00 am – 7.00 pm                      Dendritic recordings, pair recordings  
Laboratory Session                      Recordings from interneurons

8.00 – 9.00 pm                      Hot Topic Talk: Axonal guidance  
*Linda Richards, University of Queensland*

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**Saturday 28 April**                      **Autonomic neuroscience**

9.00 – 10.30 am                      Introduction to the autonomic nervous system  
*Ian Gibbins, Flinders University*

11:00 am – 12.30 pm                      Debriefing on Week 2  
  
Free afternoon

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**Sunday 29 April**                      Free day

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**WEEK 3: FLUORESCENCE IMAGING**

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**Monday 30 April**                      **Fluorescence imaging I**

9.00 – 10.30 am                      The nature and detection of light  
*Stephen Smith, Stanford University*

11.00 am – 12.30 pm                      Introduction to fluorescence microscopy  
*Karen Zito, UC Davis*

1.30 pm                      Calcium imaging in brain slices  
Laboratory Session

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**Tuesday 1 May**                      **Fluorescence imaging II**

9.00 – 10.30 am                      Calcium imaging  
*Stephen Smith, Stanford University*

11.00 am – 12.30 pm                      Advanced techniques in fluorescence microscopy  
*Karen Zito, UC Davis*

1.30 pm                      Calcium imaging in brain slices  
Laboratory Session

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**Wednesday 2 May****Visual neuroscience & Project**

9.00 – 10.30 am

Introduction to visual neuroscience  
*Dario Protti, University of Sydney*

11.00 am – 12.30 pm

Debriefing on imaging  
Data analysis

1.30 pm

Laboratory Session

Laboratory project

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**Thursday 3 May****Neuron simulations & Project**

9.00 - 10.30 am

Tutorial: The NEURON simulation program  
*John Bekkers, Stephen Redman, JCSMR*

11.00 am

Laboratory Session

Laboratory project

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**Friday 4 May**

9.00 am – 3.30 pm

Laboratory project analysis

4.00 pm – 5.30 pm

Laboratory project presentations

Closing Dinner

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**Saturday 5 May**

Farewell and Departure