

Australian Course in Advanced Neuroscience 2010

11 April – 1 May 2010 • Moreton Bay Research Station • North Stradbroke Island

Program

WEEK 1: NEURAL INTEGRATION & EXCITABILITY

Sunday 11 April

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| 5.00 pm | Welcome |
| 5.15 pm | Safety induction
<i>Kevin Townsend, Manager, Moreton Bay Research Station</i> |
| 6.00 pm | Welcome Dinner |
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Monday 12 April

Electrophysiology fundamentals

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| 9.00 – 10.30 am | Course overview
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 |
| 8.00 – 9.00 pm | Knife edge, cutting edge, leading edge: Starting and maintaining a research career
<i>Sarah Dunlop, University of Western Australia</i> |
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Tuesday 13 April

Structure-function of ion channels

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| 9.00 – 10.30 am | Structure-function studies of ion channels
<i>Sarah Lummis, University of Cambridge, UK</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 14 April	Ion channels & Action potentials
9.00 – 10.30 am	Physiology of neuronal ion channels <i>Joe Lynch, Queensland Brain Institute</i>
11.00 am – 12.30 pm	The Hodgkin-Huxley action potential <i>John Bekkers, John Curtin School of Medical Research</i>
1.30 – 6.30 pm Laboratory Session	Protocol design 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)

Thursday 15 April	Cable theory & Neuronal modelling
9.00 - 10.30 am	Cable theory and its practical consequences <i>Stephen Williams, Queensland Brain Institute</i>
11.00 am – 12.30 pm	Tutorial: The NEURON simulation program <i>Maarten Kole, John Curtin School of Medical Research</i>
1.30 pm Laboratory Session	Practise patch clamping Whole-cell current and voltage clamp

Friday 16 April	Single-channel recording
9.00 – 10.30 am	Single-channel recording and analysis <i>Angelo Keramidias, Columbia University, USA</i>
11.00 am – 7.00 pm Laboratory Session	Voltage clamp Cell-free patches and single-channel recording
8.00 – 9.00 pm	<i>Hot Topic Talk: The role of biomathematical modelling and neuroscience in the design of a visual neuroprosthesis</i> <i>Nigel Lovell, University of New South Wales</i>

Saturday 17 April	Modulation of excitability & Review
9.00 – 10.30 am	Modulation of ion channels <i>Pankaj Sah, Queensland Brain Institute</i>
11.00 am – 12.30 pm	Review of lab skills and data analysis <i>John Bekkers, John Clements, AxoGraph Scientific, Sydney</i>
1.30 pm Laboratory Session	Modulation of action potential firing

Sunday 18 April	Free day
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WEEK 2: SYNAPTIC TRANSMISSION

Monday 19 April

Synaptic transmission & Molecular biology

9.00 – 10.30 am

Introduction to the physiology of synaptic transmission
Christian Stricker, ANU Medical School

11.00 am – 12.30 pm

Molecular/genetic approaches to studying ion channels
Joe Lynch, Queensland Brain Institute

1.30 pm

Laboratory Session

Transfection of HEK cells
EPSCs and minis in hippocampus

Tuesday 20 April

Neurotransmitter release & Neurotransmission

9.00 – 10.30 am

Cell and molecular biology of transmitter release
Jane Sullivan, University of Washington, USA

11.00 am – 12.30 pm

Excitatory and inhibitory neurotransmission
John Bekkers, John Curtin School of Medical Research

1.30 pm

Laboratory Session

Pharmacology of EPSC and IPSCs
I/V plots

Wednesday 21 April

Short-term plasticity & Synaptic integration

9.00 – 10.30 am

Short-term synaptic plasticity
Jane Sullivan, University of Washington, USA

11.00 am – 12.30 pm

Synaptic integration
Nelson Spruston, Northwestern University, Chicago, USA

1.30 pm

Laboratory Session

Recording from ion channels expressed in HEK cells *and/or*
Short-term synaptic plasticity

Thursday 22 April

Long-term plasticity & Memory

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, NZ

1.30 pm

Laboratory Session

Hippocampal long-term potentiation

8.00 – 9.00 pm

Hot Topic Talk: The pivotal role of RNA in the epigenetic control of brain development, learning and memory
John Mattick, Institute for Molecular Bioscience, Queensland Univ

Friday 23 April**Microcircuits**

9.00 – 10.30 am

Neuronal microcircuits and networks
Nelson Spruston, Northwestern University, Chicago, USA

11.00 am

Laboratory Session

Dendritic recordings, pair recordings
Recordings from interneurons

Saturday 24 April**Autonomic neuroscience & Review**

9.00 – 10.30 am

The autonomic nervous system
Ian Gibbins, Flinders University

11:00 am – 12.30 pm

Review of lab skills and data analysis
Clarke Raymond, John Bekkers, John Curtin School of Med Res

Free afternoon

Sunday 25 April

Free day

WEEK 3: FLUORESCENCE IMAGING

Monday 26 April**Fluorescence imaging I**

9.00 – 10.30 am

Introduction to fluorescence microscopy
Karen Zito, University of California, Davis, USA

11.00 am – 12.30 pm

Techniques in calcium imaging
George Augustine, Duke University, USA & National University of Singapore

1.30 pm

Laboratory Session

Calcium imaging in brain slices

Tuesday 27 April**Fluorescence imaging II**

9.00 – 10.30 am

Advanced techniques in fluorescence microscopy
Karen Zito, University of California, Davis, USA

11.00 am – 12.30 pm

Manipulating neurons with light
George Augustine, Duke University, USA & National University of Singapore

1.30 pm

Laboratory Session

Calcium imaging in brain slices

Wednesday 28 April	Visual neuroscience & Project
9.00 – 10.30 am	Electrophysiology of the visual system <i>Rowland Taylor, Oregon Health & Sciences University, USA</i>
11.00 – 11.30 am	Designing the laboratory project
11.30 pm Laboratory Session	Laboratory project

Thursday 29 April	Project
9.00 am Laboratory Session	Laboratory project

Friday 30 April	Project wrap-up
9.00 am – 3.30 pm	Laboratory project analysis
4.00 pm – 5.30 pm	Laboratory project presentations
	Closing Dinner

Saturday 1 May	Farewell and departure
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