

Australian Course in Advanced Neuroscience

20 April – 10 May 2008 • Moreton Bay Research Station • North Stradbroke Island

Program

WEEK 1: NEURAL INTEGRATION & EXCITABILITY

Sunday 20 April

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| 5.00 pm | Welcome |
| 5.15 pm | Safety induction
<i>Kevin Townsend, Manager of Moreton Bay Research Station</i> |
| 6.00 pm | Welcome Dinner |
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Monday 21 April

Biophysics & channels

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| 9.00 – 10.30 am | Introduction
Basic membrane biology and circuit analysis
<i>Alan Finkel, Finkel Foundation</i> |
| 11.00 am – 12.30 pm | Neuronal ion channels
<i>Joe Lynch, Queensland Brain Institute</i> |
| 1.30 pm
Laboratory Session | Familiarisation with equipment and software |
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Tuesday 22 April

Electrophysiology fundamentals

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| 9.00 – 10.30 am | Principles of electrophysiological recording
<i>Bob Callister, University of Newcastle</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 23 April	Action potentials & cable theory
9.00 – 10.30 am	The Hodgkin-Huxley action potential <i>John Bekkers, John Curtin School of Medical Research</i>
11.00 am – 12.30 pm	Cable theory and excitability in dendrites <i>Stephen Redman, John Curtin School of Medical Research</i>
1.30 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 24 April	Structure & properties of ion channels
9.00 - 10.30 am	Structure-function studies of ion channels <i>Dan Minor, University of California, San Francisco, USA</i>
11.00 am – 12.30 pm	Mechanisms of channel gating <i>Sarah Lummis, University of Cambridge, UK</i>
1.30 pm Laboratory Session	Practise patch clamping Whole-cell current and voltage clamp

Friday 25 April	Single-channel recording
9.00 – 10.30 am	Single-channel recording and analysis <i>Louise Tierney, John Curtin School of Medical Research</i>
11.00 am – 7.00 pm Laboratory Session	Voltage clamp Cell-free patches and single-channel recording
8.00 – 9.00 pm	Hot Topic Talk: Brilliant bee brains <i>Mandyam Srinivasan, Queensland Brain Institute</i>

Saturday 26 April	Modulation of excitability
9.00 – 10.30 am	Modulation of ion channels <i>Pankaj Sah, Queensland Brain Institute</i>
11.00 am – 12.30 pm	Tutorial on data analysis <i>John Clements, AxoGraph Scientific, Sydney</i>
1.30 pm Laboratory Session	Modulation of action potential firing

Sunday 27 April	Free day
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WEEK 2: SYNAPTIC TRANSMISSION

Monday 28 April

Fundamentals of synaptic transmission

- 9.00 – 10.30 am Introduction to the physiology of synaptic transmission
Christian Stricker, John Curtin School of Medical Research
- 11.00 am – 12.30 pm Molecular/genetic approaches to studying ion channels
Joe Lynch, Queensland Brain Institute
- 1.30 pm Transfection of HEK cells
Laboratory Session EPSCs and minis in hippocampus
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Tuesday 29 April

Neurotransmitter release

- 9.00 – 10.30 am Cell and molecular biology of transmitter release
Yukiko Goda, University College London, UK
- 11.00 am – 12.30 pm Excitatory and inhibitory neurotransmission
Henry Lester, California Institute of Technology, USA
- 1.30 pm Pharmacology of EPSCs and IPSCs
Laboratory Session IV plots
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Wednesday 30 April

Synaptic plasticity & integration

- 9.00 – 10.30 am Short-term synaptic plasticity
Greg Stuart, John Curtin School of Medical Research
- 11.00 am – 12.30 pm Synaptic integration
Nelson Spruston, Northwestern University, Chicago, USA
- 1.30 pm Recording from ion channels expressed in HEK cells *and/or*
Laboratory Session Short-term synaptic plasticity
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Thursday 1 May

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, Dunedin, NZ
- 1.30 pm Hippocampal long-term potentiation
Laboratory Session
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Friday 2 May	Microcircuits
9.00 – 10.30 am	Neuronal microcircuits and networks <i>Nelson Spruston, Northwestern University, Chicago, USA</i>
11.00 am – 7.00 pm Laboratory Session	Dendritic recordings, pair recordings Recordings from interneurons
8.00 – 9.00 pm	Hot Topic Talk: Nicotine addiction <i>Henry Lester, California Institute of Technology, USA</i>

Saturday 3 May	Autonomic neuroscience
9.00 – 10.30 am	Introduction to the autonomic nervous system <i>Ian Gibbins, Flinders University</i>
11:00 am – 12.30 pm	Tutorial on the confocal microscope
	Free afternoon

Sunday 4 May	Free day
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WEEK 3: FLUORESCENCE IMAGING

Monday 5 May	Fluorescence imaging I
9.00 – 10.30 am	Introduction to fluorescence microscopy <i>Karen Zito, University of California, Davis, USA</i>
11.00 am – 12.30 pm	Techniques in calcium imaging <i>Helmut Koester, University of Texas, Austin, USA</i>
1.30 pm Laboratory Session	Calcium imaging in acute and cultured brain slices

Tuesday 6 May	Fluorescence imaging II
9.00 – 10.30 am	Functional multicell calcium imaging <i>Helmut Koester, University of Texas, Austin, USA</i>
11.00 am – 12.30 pm	Advanced techniques in fluorescence microscopy <i>Karen Zito, University of California, Davis, USA</i>
1.30 pm Laboratory Session	Calcium imaging in acute and cultured brain slices

Wednesday 7 May**NEURON simulations & Project**

9.00 – 10.30 am

Tutorial: The NEURON simulation program
John Bekkers, John Curtin School of Medical Research

11.00 am – 12.30 pm

Debriefing on imaging
Designing the laboratory project1.30 pm
Laboratory Session

Laboratory project

Thursday 8 May**Visual neuroscience & Project**

9.00 - 10.30 am

Introduction to visual neuroscience
*Paul Martin, National Vision Research Institute, Melbourne*11.00 am
Laboratory Session

Laboratory project

Friday 9 May**Project wrap-up**

9.00 am – 3.30 pm

Laboratory project analysis

4.00 pm – 5.30 pm

Laboratory project presentations

Closing Dinner

Saturday 10 May

Farewell and departure