

Australian Course in Advanced Neuroscience

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

Programme

TOPIC 1: NEURAL INTEGRATION & EXCITABILITY

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

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

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

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

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

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

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

Sunday 30 April

Free day

TOPIC 2: SYNAPTIC TRANSMISSION

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

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

Sunday 7 May

Free day

TOPIC 3: FLUORESCENCE IMAGING

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

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

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

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

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

Saturday 13 May

Farewell and Departure