

Australian Course in Advanced Neuroscience 2009

19 April – 9 May 2009 • Moreton Bay Research Station • North Stradbroke Island

Program

WEEK 1: NEURAL INTEGRATION & EXCITABILITY

Sunday 19 April

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

Monday 20 April

Electrophysiology fundamentals

- | | |
|-------------------------------|---|
| 9.00 – 10.30 am | Course overview
Basic membrane biology and circuit analysis
<i>Steve Redman, John Curtin School of Medical Research</i> |
| 11.00 am – 12.30 pm | Principles of electrophysiological recording
<i>Louise Faber, Queensland Brain Institute</i> |
| 1.30 pm
Laboratory Session | Familiarisation with equipment and software |
-

Tuesday 21 April

Structure-function 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
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) |
-

Wednesday 22 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 23 April	Biophysics & Neuronal modelling
9.00 - 10.30 am	Biophysics for neuroscientists <i>Henry Lester, California Institute of Technology, USA</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 24 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	<i>Hot Topic Talk: The Tungsten Age and the Iron Age: Tools to record neuronal activity in awake human subjects Vaughan Macefield, University of Western Sydney</i>

Saturday 25 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 26 April	Free day
------------------------	----------

WEEK 2: SYNAPTIC TRANSMISSION

Monday 27 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
-

Tuesday 28 April

Neurotransmitter release & Short-term plasticity

- 9.00 – 10.30 am Cell and molecular biology of transmitter release
Yukiko Goda, University College London, UK
- 11.00 am – 12.30 pm Short-term synaptic plasticity
Greg Stuart, John Curtin School of Medical Research
- 1.30 pm Short-term synaptic plasticity
Laboratory Session I/V plots
-

Wednesday 29 April

Exocytosis & Synaptic integration

- 9.00 – 10.30 am Mechanisms of neurotransmitter exocytosis
Meyer Jackson, University of Wisconsin, Madison, USA
- 11.00 am – 12.30 pm Synaptic integration
Nelson Spruston, Northwestern University, USA
- 1.30 pm Recording from ion channels expressed in HEK cells *and/or*
Laboratory Session Pharmacology of synaptic transmission
-

Thursday 30 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 Hippocampal long-term potentiation
Laboratory Session
-

Friday 1 May**Microcircuits**

9.00 – 10.30 am

Neuronal microcircuits and networks
*Nelson Spruston, Northwestern University, USA*11.00 am – 7.00 pm
Laboratory SessionDendritic recordings, pair recordings
Recordings from interneurons

8.00 – 9.00 pm

*Hot Topic Talk: Imaging electrical activity in intact neural circuits:
From synthetic voltage-sensitive dyes to genetically-encoded
voltage sensors*
Meyer Jackson, University of Wisconsin, Madison, USA

Saturday 2 May**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 3 May

Free day

WEEK 3: FLUORESCENCE IMAGING

Monday 4 May**Fluorescence imaging I**

9.00 – 10.30 am

Introduction to fluorescence microscopy
George Augustine, Duke University, USA

11.00 am – 12.30 pm

Techniques in calcium imaging
*Brad Launikonis, University of Queensland*1.30 pm
Laboratory Session

Calcium imaging in brain slices

Tuesday 5 May**Fluorescence imaging II**

9.00 – 10.30 am

Advanced techniques in fluorescence microscopy
George Augustine, Duke University, USA

11.00 am – 12.30 pm

Manipulating neurons with light
George Augustine, Duke University, USA

1.30 pm
Laboratory Session

Calcium imaging in brain slices

Wednesday 6 May

Visual neuroscience & Project

9.00 – 10.30 am

Electrophysiology of the visual system
Rowland Taylor, Oregon Health & Science University, USA

11.00 – 11.30 am

Designing the laboratory project

11.30 pm
Laboratory Session

Laboratory project

Thursday 7 May

Project

9.00 am
Laboratory Session

Laboratory project

Friday 8 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 9 May

Farewell and departure
