

SEMESTER I
LSM3215 NEURONAL SIGNALING AND MEMORY MECHANISMS

Prerequisite: LSM1104 General Physiology and LSM2103 Cell Biology

Workload: 24 lecture hours + 8 practical hours + 4 assignments/self-directed study + 12 tutorial hours + 2 hours CA

The module will provide fundamental knowledge about how neuronal signaling and its higher functions, such as encoding and retrieval of memory, occur in our brain. Learning and memory mechanisms are conserved in all organisms. This module covers topics including the ionic basis of resting and action potentials, molecular biology of ion and TRP channels, ion channelopathies, and the auditory system. It also focuses on neurotransmission with particular emphasis on the glutamate receptors and neuropharmacology. In addition it touches the cellular and molecular basis of learning and memory.

S/N	Topics	Lecture hours
1.	Brief Intro & functional anatomy of brain; ionic basis of electrical signalling- resting potential	2 [STW]
2.	Ionic basis of electrical signalling- action potential; molecular biology of voltage-gated ion channels	2 [STW]
3.	TRP channels as sensors of temperature or chemicals	2 [STW]
4.	Mechanisms of auditory transmission; Ion channelopathies	2 [STW]
5.	Presynaptic event: neurotransmitters and neurotransmitter release mechanisms	2 [LSC]
6.	Postsynaptic events: Molecular biology of neurotransmitter receptors	2 [LSC]
7.	Neuronal signalling and integration	2 [LSC]
8.	Synapse and neurodegenerative diseases	2 [LSC]
9.	Classifications of memory: role of hippocampus and amygdala	2 [SS]
10.	Models of memory from aplysia to human	2 [SS]
11.	Molecules and mechanisms of memory-1	2 [SS]
12.	Molecules and mechanisms of memory-2	2 [SS]
Total Lectures:		24h
Practicals:		8h
Tutorials :		12h
SDL :		4 h
CA :		2h
Total hours:		50h

COMPULSORY READING:

- 1) Neuroscience: Exploring the Brain
- 2) From Neuron to Brain, Fifth Edition

Selected reading lists relevant to particular lectures will be provided, including the latest journal articles.

SUPPLEMENTARY READING: The Hippocampus Book (Oxford Neuroscience Series)

MODE OF ASSESSMENT: 20% Tests, 20% Essays/ SDLs and 60% Final Exam

MODULE CO-ORDINATOR:

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