

Essentials of Neuroscience – 2021 (ENC2021)

July – August 2021

(One hour session every Saturday & Sunday in July - August)

Organised by Pakistan Society of Basic and Applied Neurosciences (PASBAN)

Module One: Neuron to Nervous System

Saturday, July 3, 2021

09:00 – 10:30 | Module One: Neuron to Nervous System (Part-I)

09:00 – 09:05	05 mins	Syed Ather Enam	Inauguration of ENC2021
09:05 – 09:10	05 mins	George James Augustine	Welcome Address by the Patron
09:10 – 10:10	60 mins	Syed Ather Enam	Overall Design of the Nervous System <i>General layout of the human nervous system, surface anatomy of brain and function, spinal cord, spinal reflex, brainstem and cranial nerve nuclei</i>
10:10 – 10:20	10 mins	Moderator	Q/A
10:20 – 10:30	10 mins	Moderator	Online Quiz

Sunday, July 4, 2021

09:00 – 10:20 | Module One: Neuron to Nervous System (Part-II)

09:00 – 10:00	60 mins	Syed Ather Enam	Nervous System at the Cellular Level <i>Neuron, glia, myelin, cell membrane, neural and glial cytoskeleton, axoplasmic transport, histology of cerebral cortex</i>
10:10 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Module Two: The Chatting Neurons

Saturday, July 10, 2021

09:00 – 10:20 | Module Two: The Chatting Neurons (Part-I)

09:00 – 10:00	60 mins	Syed Ather Enam	Electrical Properties of Neurons <i>Resting membrane potential, ion channels and transporters, Nernst equation and Goldman-Hodgkin-Katz voltage equation, action potential</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Sunday, July 11, 2021

09:00 – 10:20 | Module Two: The Chatting Neurons (Part-II)

09:00 – 10:00	60 mins	Syed Ather Enam	Synaptic Transmission <i>Cellular communication, electrical and chemical synapses, neurotransmitters, neuropeptides, synaptic vesicles and release, metabotropic and ionotropic receptors, second messenger system</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Module Three: Deep in the Brain

Saturday, July 17, 2021

09:00 - 10:20 | Module Three: Deep in the Brain (Part-I)

09:00 - 10:00	60 mins	Syed Ather Enam	Basal Ganglia and Thalamus <i>Basal ganglia and components, motor control by basal ganglia, anatomy and function of thalamus, basal ganglia and thalamus in disease</i>
10:00 - 10:10	10 mins	Moderator	Q/ A
10:10 - 10:20	10 mins	Moderator	Online Quiz

Sunday, July 18, 2021

09:00 - 10:20 | Module Three: Deep in the Brain (Part-II)

09:00 - 10:00	60 mins	Syed Ather Enam	Cerebellum and Reticular Activating System <i>Anatomy of cerebellum, deep cerebellar nuclei, cerebellar circuit, reticular activating system anatomy and function, circadian rhythm, vestibulocochlear system</i>
10:00 - 10:10	10 mins	Moderator	Q/ A
10:10 - 10:20	10 mins	Moderator	Online Quiz

Module Four: Understanding Memory, Behavior and Emotions

Saturday, July 24, 2021

09:00 - 10:20 | Module Four: Understanding Memory, Behavior and Emotions (Part-I)

09:00 - 10:00	60 mins	Syed Ather Enam	Neurobiology of Memory <i>Types of memory, dementia, habituation and sensitization, long term potentiation and depression, molecular correlates of memory, dendritic spines, synaptic plasticity</i>
10:00 - 10:10	10 mins	Moderator	Q/ A
10:10 - 10:20	10 mins	Moderator	Online Quiz

Sunday, July 25, 2021

09:00 - 10:20 | Module Four: Understanding Memory, Behavior and Emotions (Part-II)

09:00 - 10:00	60 mins	Syed Ather Enam	Neurobiology of Behavior and Emotions <i>Limbic System, types of emotion, amygdala, neurophysiology of pain, neurotransmitters of emotion, hypothalamus olfactory and gustatory, pain</i>
10:00 - 10:10	10 mins	Moderator	Online Quiz
10:10 - 10:20	10 mins	Moderator	Q/ A

Module Five: The Amazing Story of Brain Development

Saturday, Jul 31, 2021

09:00 – 10:20 | Module Five: The Amazing Story of Brain Development (Part-I)

09:00 – 10:00	60 mins	Syed Ather Enam	CNS Development I <i>Neural tube formation, congenital abnormalities, homeobox genes, embryonic induction, neuronal migration, neurotrophic factors</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Sunday, August 01, 2021

09:00 – 10:20 | Module Five: The Amazing Story of Brain Development (Part-II)

09:00 – 10:00	60 mins	Syed Ather Enam	Evolution of Human Brain <i>Single cell to multicellular organism, Simple nervous system, growth of brain, comparison of brain of mammals, primates and genus Homo.</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Module Six: What is Special about the Human Brain

Saturday, August 7, 2021

09:00 – 10:20 | Module Six: What is Special about the Human Brain (Part-I)

09:00 – 10:00	60 mins	Syed Ather Enam	Cognition and Communication <i>Neural basis of language, aphasias, visual system, from image on the retina to simple perception and cognition, association cortex and cognition.</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Sunday, August 8, 2021

09:00 – 10:20 | Module Six: What is Special about the Human Brain (Part-II)

09:00 – 10:00	60 mins	Syed Ather Enam	Awareness and Consciousness <i>Neuroanatomy of attention and planning, neural basis of intelligence, thoughts about awareness and consciousness.</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Module Seven: Neurobiology of Diseases

Saturday, August 14, 2021			
09:00 – 10:20 Module Seven: Neurobiology of Diseases (Part-I)			
09:00 – 10:00	60 mins	Syed Ather Enam	Molecular and Cell Biology of Neurodegeneration <i>Alzheimer's disease, Parkinson's disease, trinucleotide repeat disorders, motor neuron disease, demyelinating diseases, excitotoxicity</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Sunday, August 15, 2021			
09:00 – 10:20 Module Seven: Neurobiology of Diseases (Part-II)			
09:00 – 10:00	60 mins	Syed Ather Enam	Regeneration and Oncogenesis <i>Regeneration in peripheral nerves, regeneration in spinal cord and brain, molecular biology of brain tumor, stem cells</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Module Eight: Cutting Edge Technology in Neuroscience

Saturday, August 21, 2021			
09:00 – 10:20 Module Eight: Cutting Edge Technology in Neuroscience (Part-I)			
09:00 – 10:00	60 mins	Syed Ather Enam	Advances in Diagnosis and Management of Neurological Diseases <i>Neuro-imaging, interventional radiology, robotics in neurosurgery, neuronavigation, awake craniotomy, nanotechnology, gene therapy, radiosurgery, deep brain stimulation</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

Sunday, August 22, 2021			
09:00 – 10:20 Module Eight: Cutting Edge Technology in Neuroscience (Part-II)			
09:00 – 10:00	60 mins	Syed Ather Enam	State of the Art Neuroscience Research <i>Neural cell culture, immunohistochemistry, electron and confocal microscopy, patch clamp, animal research, RT-PCR, CRISPR, NGS, iPSC, human-machine interface, artificial intelligence</i>
10:00 – 10:10	10 mins	Moderator	Q/A
10:10 – 10:20	10 mins	Moderator	Online Quiz

10:20 – 10:30	10 mins	Syed Ather Enam	Wrap up & Closing Remarks
---------------	---------	-----------------	---------------------------

Book reference for this course is:

Neuroscience 6th Edition. Edited by Dale Purves, George J. Augustine, David Fitzpatrick, William C. Hall, Anthony-Samuel LaMantia, Richard D. Mooney, Michael L. Platt, and Leonard E. White, Oxford University Press, October 2017, ISBN: 9781605353807