

Subjects list for Nervous System Lectures – 6 - 7 December 2018

1. Nervous system components and subdivisions
2. Neuron: structure and compartmentalization
3. Features of axoplasmic transport
4. Neuronal and non-neuronal cells: types and characteristics.
5. Cell membrane potential: Resting membrane potential
6. Diffusion and the cell membrane potential. Nernst potential
7. Voltage-gated Na ion channels
8. Voltage-gated Ca ion channels
9. Ion pumps: characteristics, functions and examples
10. Membrane responses to stimulus current: hyperpolarization current, depolarization current, threshold current
11. Nerve action potential: phases, ionic conductance during AP
12. Na channels distribution and generation of AP. Axon depolarization.
13. Myelin; saltatory conduction
14. Electrical synapse: structure, function, occurrence in the nervous system
15. Chemical synapse: Presynaptic mechanisms - mechanism of transmitter release
16. Chemical synapse: Postsynaptic mechanisms: ionotropic, metabotropic
17. Control of transmitter activity in the synaptic cleft
18. Glutamate and glutamate receptors
19. GABA and GABA receptors
20. Acetylcholine and Ach receptors
21. Norepinephrine and adrenergic receptors
22. Dopamine and dopamine receptors
23. Serotonin and serotonin receptors
24. Explain the differences between ionotropic and metabotropic receptors
25. Excitatory postsynaptic potentials (EPSPs)
26. Inhibitory postsynaptic potentials (IPSPs)
27. Glial cell functions at synaptic level
28. Skeletal muscle structure: components and their functions
29. Neuromuscular junction – components and their roles
30. Nicotinic receptor at the neuromuscular junction
31. AP generation and transmission in the muscular fiber
32. T tubules in the skeletal muscle; triad and tetrad
33. Excitation-Contraction coupling
34. Mechanism of muscle contraction and relaxation
35. Calcium homeostasis in the skeletal muscular contraction
36. Motor unit
37. Muscle fatigue
38. Classification of the sensory receptors
39. Adaptation of sensory receptors. Tonic vs. phasic receptors
40. Sensory unit and the receptive field
41. Pain receptors and their stimulation
42. Types of pain: fast and slow
43. External layer of the eye- components and function

44. Accommodation
45. Pupillary reflex
46. The lens system of the eye; focal point
47. Emmetropia and refraction errors
48. Visual acuity
49. Photopic and scotopic vision
50. Fluid system of the eye
51. Cellular organisation of the retina
52. Photoreceptor cells
53. Phototransduction
54. Colour vision
55. Optical pathway
56. Cochlea and the Corti organ- structure and function
57. Vestibular receptors- structure and function
58. Air conduction of the sound to the hair cells and signal transduction
59. Sound pitch and intensity determination
60. Hair cells innervation and the main auditory pathway neurons (the four neurons and location of the auditory cortex)
61. Vestibular pathway- neurons, connections and cortical projection
62. Olfactory mucosa- structure and function
63. Olfactory pathway- main neurons and cortical projection
64. Olfactory signal transduction
65. Taste receptors- location, structure and function
66. Gustative pathway and cortical projection
67. Organization of the visceral control system – the sympathetic division
68. Organization of the visceral control system – the parasympathetic division
69. Organization of the visceral control system – the enteric division
70. Classic neurotransmitters of the autonomic nervous system
71. Non-classic transmitters of the autonomic nervous system
72. Effects of the sympathetic system on visceral targets
73. Effects of the parasympathetic system on visceral targets
74. Central nervous system control of the viscera
75. Reflex loops of the autonomic nervous system