السنة الثالثة – الفصل الثاني
الجهاز العصبي والحواس
Neurosciences and Special Senses
(0500311)
(8) Credit Hours

In some years this is divided into: Neurosciences and Special Senses-1 (0500311) (4) Credit Hours and Neurosciences and Special Senses-2 (0500312) (4) Credit Hours

Objectives:

By the end of this course, the student should be able to:

1. describe and identify the gross morphology and microanatomy of the central and peripheral nervous system.
2. identify the organs of the special senses and describe their anatomical features and histology.
3. describe the functions of the central and peripheral, and relate structure to function.
4. describe the functions of the organs of the special senses and relate structure to function.
5. list molecules involved in the normal functioning of the central and peripheral nervous systems, their characteristics and regulation.
6. list the pathologic disorders that affect the central and peripheral nervous systems, their pathogenesis and manifestations.
7. Mention infections of the CNS, including their etiologic agents, pathogenesis, manifestations and diagnosis.
8. list most important drugs used in the treatment of disorders that affect the central and nervous systems including their pharmacologic properties, indications, doses and side effects.
9. describe the epidemiology of diseases that affect the nervous system.
10. take comprehensive history and perform a proper physical examination of the central and peripheral nervous system.

Content Summary:

-	Anatomy and histology Theory (22) Practical (14)	(36)	hours
-	Physiology	(24)	hours
-	Biochemistry	(4)	hours
-	Pathology	(12)	hours
-	Microbiology	(8)	hours
-	Pharmacology	(20)	hours
-	Epidemiology	(4)	hours
-	Clinical aspects	(12)	hours
	Total	120	hours

Anatomy:

36 hours

Theoretical Anatomy of the Central Nervous System:

1- Introduction and Nomencloture of the CNS (1 lecture)

Note on the evolution of the CNS, comparative anatomy.

Need for the CNS and its elaboration beyond the action and reaction response in man.

Nomen Clature: spinal cord, brainstem, cortex

2- Classification of nerve fibers (1 lecture)

The different sizes of axons, their classification and the meaning of their diversity (e.g. muscle spindle).

3- Spinal Cord

Factors of lamination, cytoarchitecuring, lamination of the cord. Differences among the regions of the cord. (1 lecture)

4- Brainstem:

Transformation of the cord into brainstem.

Organization of the dorsal column. Longitudinal and transverse organization of the brainstem. (2 lectures)

Tracteology (in short) Somaesthetic (anterolateral, medical lemniscal, Spinocervical pathways.

Proprioceptive anterior, posterior, rostral and Cuneocerebellar tracts. (2 lectures)

Corona radiata, internal capsules, cerebral peduncle

Pyramidal tract and gamma loop. (1 lecture)

Trigeminal system, Auditory pathway, vestibular system, facial nerve, Ambiguus system and hypoglossal nerve ocular innervation, Visual pathway, (6 lectures)

Thalamus, lamina quadrigemina, and basal ganglia. (2 lectures)

5- Cerebellum

subdivision, deep cerebellar nuclei, cerebellar peduncles, architecture and connection, proprioception (1 lecture)

6- Cerebral cortex

neocortex (motor cortex, sensory cortex primary, secondary and association cortices, different representation maps). (1 lecture)

archicortex (limbic system and olfactory pathway) (1 lecture)

ventricular system (lateral ventricle, third ventricle, fourth ventricle, the central canal and the subarachnoidal space) (1 lecture)

The basal ganglia and the extra-pyramidal tracts (1 lecture)

7- Meninges and blood supply of the brain

pacchymentix, leptomeninx, dural sinuses, spaces, innervation, blood supply (anterior circulation, posterior circulation, circle of Willis) (1 lecture)

PRACTICAL ANATOMY OF THE CENTRAL NERVOUS SYSTEM

1) General identification of brain specimens One practical Session (2hr.)

2) General identification of spinal cord on specimens (anterior root, posterior root, spinal ganglion, cauda equine, enlargements of the corde, blood supply of the cord). One practical Session (2hr)

3) Topography of the spinal cord

Spinal cord- vertebral column relationship, gross- and Micro-anatomy of the spinal cord, identification of the Various regions of the cord (histology slides).One practical Session (2hr)

4) The brainstem

Closed medulla (Motor decussation one section
Sensory decussation one section)

Open medulla (One section) Two practical Session (4hr.)

Pons (Three section: caudal- mid Pontine and isthmus pontis)Two practical Session (4hr.)

Midbrain (two section: superior collicular Level and inferior collicular level) One practical Session (2hr)

Mesencephalic-Diencephalic junction (one section)One practical Session (2hr)

5) Cerebellum and cerebell. Peduncles
(Gross-and micro-anatomy) One practical Session (2hr.)

6) Cerebral cortex
Cyto- architecturing
Identification gyri, sulci and regions
Coronal sections of prosencephalon
Sagittal and prasagittal of the prosencephalon
horizontal sections of the prosencephalon
ventricular system (Lateral ventricle, third ventricle,
fourth ventricle)
The central canal and the subarachnoidal space. Two practical Sessions (4hr)

7) Meninges and blood supply of the brain
Pacchymeninx, leptomeninx, dural sinuses,
Spaces, innervation, blood supply
(anterior circulation, posterior circulation, circle of Wiilis)
Revision Two practical Session (4hr)

PHYSIOLOGY

(24) CONTACT HOURS:

- CNS ORGANIZATION 1 lecture
I. Nervous System,
A. Functions of the Nervous System.
B. Comparison with Endocrine System.
II. Organization of the Nervous System
A. Sensory system and its components.
B. Motor System and its components
C. Integration Center and its components.
- SYNAPTIC FUNCTION: 2 lectures

I. Functional Parts of Neurons
A. Input Component of a Neuron
B. Integrative Component and Trigger Zone of a Neuron
C. Conductile Component of a Neuron
D. Output Component of a Neuron

II. The Resting Membrane Potential
A. Important Factors Contributing to the RMP
B. Generation and Maintenance of the RMP
C. Effects of Electrolytes on the RMP
1. Effects of Na Ions on the RMP
2. Effects of K Ions on the RMP
3. Effects of Ca Ions on the RMP

III. Initiation and Conduction of the Action Potential
A. Generation of the Action Potential at the Trigger Zone
B. Control of the Pattern of Neuronal Firing
1. Interaction of Inhibitory and Excitatory Synaptic Potentials
2. Refractory Periods
3. Hyperpolarizing Afterpotentials due to Calcium-gated K+ Channels
C. Spread of the Action Potential to the Axon
D. Conduction in Axon
1. The Conduction Cycle:

Conduction of the Action Potential in the Axons
2. The Importance of Myelination
3. Saltatory Conduction in a Myelinated Axon
E. Conduction Failure in Demyelinating Diseases
IV. Synaptic Potentials and Neurotransmitters
A. Fast, Conductance-Increase Synaptic Potentials (EPSPs and IPSPs) Produced by Ionotropic Synaptic Action (Small Molecules Rapidly Acting Neurotransmitters)
B. Slow Synaptic Potentials Produced by Metabotropic Synaptic Action (Large Molecules Slowly Acting Neurotransmitters)
1. Regulation of Intracellular Second Messengers by G Proteins
2. Common Second Messengers
C. Neurotransmitters
VI. Determinants of Synaptic Action
A. The Sign of Synaptic Action
B. Amplitude of Synaptic Potentials
1. Presynaptic Inhibition

- SENSORY RECEPTORS, FUNCTION AND NEURONAL MECHANISMS — 2 lectures

Somatic Sensibility
I. Basic Features of Neuronal Connections and Operations
A. Divergence and Convergence
B. Synapticity
C. Signals and Noise in the Brain
D. Mechanisms for Changing Firing Rate
II. Submodalities of Somatic Sensibility , Adequate Stimulus.
III. Sensory Transduction
A. At Mechanoreceptors
B. At Nociceptors
IV. Receptors and Afferent Fibers
A. Types of Primary Afferent Fibers
B. Touch, Pressure, and Vibration
1. Receptors
2. Rate of Adaptation
3. Receptive Fields
4. Properties of Mechanoreceptors
C. Proprioception (Limb/Joint Position)
1. Properties of Proprioceptors

- SOMATIC SENSATION, TACTILE AND POSITION — 2 lectures

V. The Dorsal Column - Medial Lemiscal (DC-ML) System and Its Trigeminal Analogues
A. Anatomical Components of the DC-ML System
B. Trigeminal Analogues of the DC-ML System
C. Primary Somatic Sensory (SI) Cortex
1. Somatotopic Organization of the SI Cortex
2. Multiple Maps of the Body in the SI Cortex
3. Columnar Organization of the SI Cortex
4. Efferent Projections from the SI Cortex
D. Secondary Somatic Sensory (SII) Cortex
E. Somatic Sensory Association Cortex

F. Functional Properties of the DC-ML System
1. Specialized Receptors &Medium- and Large-diameter Afferent Fibers
2. Young Phylogenetic Age
3. Precise Somatotopic Organization of the DC-ML System
4. Small Receptive Fields of DC-ML System Neurons
5. High Fidelity System
6. Afferent Surround Inhibition in the DC-ML System
7. Efferent Control of Somatosensory Input
8. Spatial Discrimination by theDC-ML System
G. Clinical Features of DC-ML System Lesions
1. Sensory Deficits
2. Importance of the Pattern of Sensory Loss
3. Importance of Somatic Sensory Association Cortex

- SOMATIC SENSATION, PAIN AND THERMAL 1 lecture

VI. Receptors of Pain And Temperature
A. Nociception (Pain)
B. Thermoception (Hot and Cold)
1. Properties of Thermoceptors
2. Responses of Thermoceptive Afferents

VII. The Spinothalamic (Anterolateral) System and its Trigeminal Analogues
A. Features of the Pain Experience
B. Anatomical Components of the Spinothalamic System
C. Trigeminal Analogues of the Spinothalamic System
D. Functional Properties of the Spinothalamic System
1. Unspecialized Receptors and Small Afferent Fibers
2. Old Phylogenetic Age
3. Coarse Somatotopic Organization of the Spinothalamic System
4. Large, Multimodal Receptive Fields in the Spinothalamic System
5. Cortical Contribution to Pain Perception by the Spinothalamic System
6. Plasticity of the Pain Experience
E. Control of Nociceptive Inputs by the CNS
1. Gate Control Theory of Melzack & Wall
2. Efferent Control
3. Enkephalins and Endorphins
F. Clinical Features of Lesions of the Spinothalamic System
G. Important Forms of Pain

- VISION 3 lectures

*** Sight
I. Optical Characteristics of the Eye
A. Light: The Adequate Stimulus for Vision
B. The Eye as an Optical Instrument
C. Refraction
D. The Pupil
E. Optical Defects
1. Myopia (Nearsightedness)
2. Hyperopia (Farsightedness)
3. Presbyopia
4. Spherical and Chromatic Abberation
II. The Retina

A. Features of Rod and Cone Systems
B. Phototransduction in Rods
1. The Photopigment, Rhodopsin
2. Activation of Transducin
3. Activation of Phosphodiesterase
4. Hydrolysis of cGMP to 5' GMP Causes Hyperpolarization
C. Phototransduction in Cones
D. Electrical Responses of Photoreceptors
E. Dark and Light Adaptation of Rods and Cones
F. Visual Afterimages
G. High Visual Acuity of Foveal Vision
V. Retinal Processing of Visual Input
A. Retinal Ganglion Cells
B. Receptive Fields (RFs) of Retinal Ganglion Cells
C. Two Basic Retinal Circuits
D. Synaptic Operations in the Retina
E. Generation of an On-center, Off-surround Receptive Field
1. Stimulation of the Receptive Field Center
2. Stimulation of the Receptive Field Surround
F. Two Types of Bipolar Cells
G. Functions of Antagonistic Center-Surround Receptive Fields
H. Receptive Field Size
I. Color Coding by Ganglion Cells
III. Image Processing in the Lateral Geniculate Nucleus
IV. Cortical Processing of Visual Input
A. Primary Visual (VI) Cortex
1. Retinotopic Organization
2. Receptive Fields
a. Simple and Complex Cells
b. Color Coding by Cortical Cells
c. Ocular Dominance
d. Stereopsis (Depth Perception)
3. Cortical Columns
B. Other Cortical Areas Important for Sight

-. HEARING 2 lectures
*** Hearing
I. The Auditory System
A. Peripheral Component
1. Ear
2. Middle Ear
3. Inner Ear
B. Central Components
II. The Adequate Stimulus
A. Sound Intensity and Frequency
B. Transmission of Sound Energy Within the Ear
III. The Cochlea and the Organ of Corti
A. Physical Properties of the Basilar Membrane
B. Excitation of Hair Cells
C. Electrical Potentials of the Cochlea
IV. Neural Processing
A. The Audibility Curve

B. Receptive Fields of Auditory Neurons
C. Neural Codes
D. Efferent Control of Auditory Input
1. Efferent Fibers in the Olivocochlear Bundle
2. The Acoustic Reflex
V. Clinical Features of Lesions in the Auditory System
A. Conduction and Sensorineural Deafness
B. Lesions of Central Pathways

-. TASTE AND SMELL 1 lecture
*** Chemical Senses
I. Taste
A. Taste Buds: The Taste Receptors
B. Receptor Physiology
1. Basic Taste Modalities
2. Receptor Potentials in the Taste System
3. Discrimination of Flavors
4. Threshold and Intensity Discrimination of Taste Responses
C. Central Pathways of Taste
D. Theories of Taste Perception
E. The Biological Value of Taste
II. Olfaction
A. Flow of Olfactory Information
B. Olfactory Pathways and Receptors
C. The Physiology of Olfaction
1. Olfactory Thresholds and Discrimination
2. Signal Transduction in the Olfactory System
3. Odorant Binding Proteins
4. Odor Receptors
5. Sniffing and Adaptation of Olfactory Receptors
D. Olfactory Interaction with other Limbic System Functions

- MOTOR SYSTEM, SPINAL CORD 2 lectures
** Spinal Reflexes
I. Spinal Reflexes
A. Features of Reflexes
1. The Reflex ARC
II. Muscle Receptors
A. Muscle Spindles
1. Afferent Fibers of Muscle Spindles
2. Adequate Stimulus for Muscle Spindles
3. Motor Innervation of Muscle Spindles
B. Golgi Tendon Organs
1. Innervation of Golgi Tendon Organs
2. Adequate Stimulus for Golgi Tendon Organs
C. Responses of Group I Afferent Fibers to Muscle Stretch and Contraction
D. Responses of Free Nerve Endings to Muscle Stretch and Contraction
E. The Stretch (myotatic, DTR) Reflex
1. Adequate Stimulus for the Stretch Reflex
2. Stretch Reflex Circuitry
3. The Stretch Reflex: An Animated Summary
4. Stretch Reflex Action

5. Functional Roles of the Stretch Reflex
6. Supraspinal Regulation of the Stretch Reflex
F. The Tendon reflex
1. Adequate Stimulus for the Tendon reflex Reflex
2. Golgi Tendon Organ Receptor
3. Tendon reflex Circuitry
4. Tendon reflex Action
5. Functional Roles of the Tendon reflex
6. Supraspinal Control of the Tendon reflex
G. The Flexion (Withdrawal) Reflex
1. Adequate Stimulus for the Flexion Reflex
2. Flexion Reflex Circuitry
3. Neuronal Operations of the Flexion Reflex
4. Flexion Reflex Action
5. Functional Roles of the Flexion Reflex
6. Supraspinal Control of the Flexion Reflex
H. Clinical Importance of Reflexes

-. BRAIN STEM 1 lecture
*** Balance and Equilibrium
I. Functional Roles of the VestibularSystem
II. The Vestibular Apparatus
A. Semicircular Canals
1. Orientation
2. Receptors
a. Morphologic Polarization
b. Continuous Release of Neurotransmitter
c. Adequate Stimulus
3. Central Connections
B. Maculae of the Utricles and Saccules
1. Receptors
a. Morphologic Polarization
b. Continuous Release of Neurotransmitter
c. Adequate Stimulus
2. Central Connections
III. Effect of Rotation on Equilibrium and Eye and Body Muscles
A. Getting Oriented
B. At the Beginning of Rotation
1. Endolymph Flow
2. Effects on Eye Movements
3. Effects on Other Muscles and on Equilibrium
4. Duration of Nystagmus
5. Optokinetic Nystagmus
C. At the Cessation of Rotation
1. Endolymph Flow (Animation)
2. Effects on Eye Movements
3. Effects on Trunk and Limb Muscles
4. Effects on Equilibrium
5. Summary: Effects of Suddenly Stopping Rotation to the Right

*** Motor Systems
I. The Nature of Motor Control

II. Upper Motor Neurons (UMNs)
A. Three UMN Pathways
B. UMN Actions
C. UMN Termination in the Spinal Cord
D. Signs of UMN Damage
III. Features of Motor Pathways
A. Medial Brainstem Motor Pathway
B. Lateral Brainstem Motor Pathway
C. Corticospinal Motor Pathway
IV. Examples of UMN Problems
A. Decerebrate Rigidity
B. UMN Disease
C. Spinal Cord Transection

- CEREBELLUM 2 lectures
I. The Cerebellum:
A. Functional Subdivisions of the Cerebellum
1. The Vestibulocerebellum
2. The Spinocerebellum
3. The Cerebrocerebellum
B. Unique Features of the Cerebellum
C. Neuronal Processing in the Cerebellum
1. The Functional Circuit
2. Most Important Neuronal Connections
3. Mossy Fiber Excite a Strip of Purkinje Cells
4. Inhibitory Shaping of Nuclear Cell Discharge
5. Climbing Fibers
D. Function of the Cerebellum
E. Clinical Signs of Cerebellar Dysfunction

-. BASAL GANGLIA 1 lecture
I. The Basal Ganglia
A. Basic Circuitry of the Basal Ganglia
B. Neurotransmitters
C. Two Circuits Out of the Basal Ganglia – Direct and Indirect Pathways.
D. Parkinsonism

-. MOTOR CORTEX 1 lecture
I. The Motor Cortex (MI) and Corticospinal Tract
A. Fallacy of the Pyramidal Syndrome
B. Primary Motor (MI) Cortex
1. Topographic Organization of MI Cortex
2. Afferent Inputs to the MI Cortex
3. Columnar Organization of the MI Cortex
4. Neuron Discharge/ with Voluntary Movement

- CEREBRAL CORTEX, ITELLECTUAL FUNCTIONS 1 lecture
***Speech and Higher Cortical Function
I. The Prefrontal Association Areas
A. Frontal Granular Cortex
B. The Orbitofrontal Cortex
C. Prefrontal Leucotomy in Humans

D. The Prefrontal Cortex in Schizophrenia
II. Posterior Association Areas Parietal/Occipital/Temporal Cortex
A. Speech Functions
1. Posterior Speech Cortex
2. Anterior Speech Cortex
3. The Arcuate Fasciculus
4. Motor Writing Center
5. Angular and Supramarginal Gyri
6. Regional Blood Flow and Speech
7. Connections Between the Speech-Sensitive Areas
8. Gender Differences in Speech Integration
B. Non-Dominant Side Parietal Association Cortex]
III. The Two Cerebral Hemispheres are Asymmetrical
A. Anatomical Hemispheric Asymmetry
B. Functional Hemispheric Asymmetry

****** Learning and Memory 1 lecture
I. Memory Dysfunction
A. The Amnestic-Confabulatory Syndrome: Wernicke-Korsakoff Encephalopathy
B. Amnesia Following Anterior-Medial Temporal Lobe Lesions
C. Progressive Dementia (Treatable Causes of Dementia)
II. The Stages of Memory Consolidation
A. Measuring Immediate Memory
B. Measuring Recent Memory
C. Measuring Long-Term Memory
III. Long-Term Memories are More Durable than Recent Memories
IV. Mechanisms of Memory
A. Mechanisms of Immediate Memory
1. Immediate Memory is Associated With Reverberation in Wide Spread Regions
2. Immediate Memory is Supported by the Prefrontal Lobes
B. The Anatomy of Recent Memory
1. Medial Temporal Lobe Amnesia
. Long Term Potentials in Hippocampus
3. The Hippocampus and Amygdala Interface the Sensory Environment and Autonomic Responses
4. Infero-temporal Cortex
5. The Mammillary Bodies
6. The Periaqueductal Gray Matter
7. The Dorsomedial Thalamus
C. Mechanisms of Long-Term Memory
3. Protein Synthesis and New Synapses
V. Neurotransmitters and Memory
A. Acetylcholine and Memory
B. Norepinepherine and Memory
C. Serotonin and Memory

-. RETICULAR ACTIVATING SYSTEM AND SLEEP 1 lecture
*** Attention, Alertness, EEG,
III. The Ascending Reticular Arousal System (ARAS)
A. The Brainstem Component of the ARAS

*** Sleep

I. Classification of the Stages of Sleep
A. The Electrographic Measurement of Sleep
B. Mental and Electrographic Correlates of Slow Wave Sleep
C. Mental and Electrographic Correlates of REM Sleep
1. Mental
2. Electrographic
3. Other Physiologic
B. Progression of Sleep Stages During a Typical Night
C. The Effects of Aging upon the Stages of Sleep
II. Mechanisms of Sleep
A. Overview of Anatomical & Physiological Mechanisms of Sleep
B. Circadian Rhythms
C. Mechanisms of Slow Wave Sleep
D. Mechanisms of Rapid Eye Movement Sleep
E. Endogenous Sleep Factors
III. Clinical Correlates of Sleep Staging
A. The Effects of Sleep Loss
B. The Effects of Drugs on Sleep

Acetylcholine
Chemistry, synthesis, storage and release
Acetylcholine esterase and termination of Acetylcholine action
Nicotinic and muscarininc receptors
Catecholamines and other neourotransmitters
Synthesis, storage and release
Receptors
Serotonin histamine GABA, glycine
Neuropeptides
Signal transduction in photoreception
Molecular and metabolic basis of some neurological disorders
Parkinson's disease
Alzheimer's

Chemistry
(4 contact hours)
Acetylcholine
Chemistry, synthesis, storage and release
Acetylcholine esterase and termination of Acetylcholine action
Nicotinic and muscarininc receptors
Catecholamines and other neurotransmitters
Synthesis, storage and release
Receptors
Serotonin histamine GABA, glycine
Neuropeptides
Signal transduction in photoreception
Molecular and metabolic basis of some neurological disorders
Parkinson's disease
Alzheimer's

Pathology
12 lectures:
1.

- General concepts: cerebral edema, raised intracranial pressure, herniation and hydrocephalus.
- Trauma to the CNS : skull fractures, parenchymal injuries (concussion, contusion, laceration, diffuse axonal ingury), traumatic vascular injury (epidural, subdural hematoma).

2.

- Malformations and developmental abnormalities: neural tube defects, forebrain anomalies, posterior fossa anomalies, syringomyelia, perinatal brain injury.
- Phacomatosis.

3.

- Cerebrovascular diseases:-

Concept of autoregulation
Classification
Global hypoxia – ischemia encephalopathy
Infarcts (introduction, transient ischemic attack, middle cerebral artery, internal carotid artery, vertebro- basilar artery).
Intraparenchymal hemorrhage
Subarachnoid hemorrhage
Vascular malformations

4.

- infection:-

Routes of infection.
Epidural and subdural infections
Meningitis (acute supprative, acute asepic, chronic meningitis).
Parenchymal infections (encephalitis, brain abscesses).
Prion diseases

5. and 6.

- Degenerative disease:-

Cerebral cortex (Alzheimer disease, picks disease)
Basal ganglion and brain stem (Parkinson disease,
Huntington disease).
Spinocerebellar(Fridreich ataxia, Ataxia- Telangectasia)
Motor neurons (amyotrophic lateral sclerosis)

7.

- Demyelination disorders (leukodystrophies, multiple sclerosis)

8.

- Tumors of the CNS

Primary vs. secondary
Primary CNS tumors
    Astrocytoma (fibrillary and pilocytic)
    Oligodendroglioma
    Ependymoma
    PNET, medulloblastoma
    Neural tumors
    Lymphoma
    Meningioma
Metastatic tumors

9.

- Peripheral nerve:

Inflammotory neuropathies
Acquired metabolic and toxic neuropathies

Traumatic neuropathies
Tumors of peripheral nerves
10.
- Disease of skeletal Muscles:

Denervation atrophy (infantile motor neuron disease)
Muscle dystrophies (X- linked; DMD, BMD, myotonic dystrophy)
Inflammatory myopathies
Diseases of the neuromuscular junction.

Practical Session:

Two practical sessions each consists of 2 contact hours

Week one:-

Gross and microscopic examples of herniation, hydrocephalus, malformations, infarcts and infections are discussed.

Week Two:-

Gross and microscopic features of common brain tumors are discussed. Examples of myopathies and neuropathies are covered.

Microbiology

(6 hours)

Infections:

Bacterial:
- Neisseria meningitidis
- Haemophilus influenzae
- Liseria, E. coli, Mycobacteria
- Clostridium tetani and botulinium
- Spirochaetes, staph, Strep. Group B, Leptospira
- Chlamydia trachomatis, Rickettsia, Pseudomonas

Viral:
- Polio virus
- Herpes viruses. Enteroviruses. Measles. Mumps. Rubella.
- Rabies virus
- Togaviruses and Flaviviruses. Bunyaviruses. Coxsaki viruses
- Slow viruses and prions. ECHO viruses

Parasites and fungi:
- Amoebae, trypanosoma, Toxoplasma
- Onchocerca, Taenia solium
- Gryptococcus, candida

Pharmacology of Nervous System

(20 hours)

1- Autonomic nervous system
- Receptors and neurotransmitter of ANS (one lecture)
- Adrenomimetic drugs (one lecture)
- Adrenalytic drugs (one lecture)
- Cholinomimetic drugs and antagonists (two lecture)
- Ganglionic blocking drugs and ergot alkaloids (one lecture)
- Local anaesthetics (one lecture)

2- Neuromuscular blocking agents:
- Depolarizing blocker (one lecture)
- Nondepolarizing blockers (one lecture)

3- Central Nervous System:
- Receptors and neurotransmitters of CNS (one lecture)
- General anaesthetics (two lectures)
- Opioid and nonopiod analgesics (two lectures)

- Sedative – hypnotics (one lecture)
- Antidepressants (one lecture)
- Antipsychotics (one lecture)
- Anticonvulsants (one lecture)
- Antiparkinsonian drugs (one lecture)
- CNS stimulants (one lecture)
- CNS drug abuse (one lecture)

Clinical Aspects:

Lecture 1 Cognitive functions
Lecture 2 Cranial nerves
Lecture 3 Motor system
Lecture 4 Sensory system and cerebellar function
Lecture 5 Approach to pediatric neurology patient
Lecture 6 Paroxysmal neurology disorders
Lecture 7 Static and regressive neurological disorders
Lecture 8 Neuro surgery 1
Lecture 9 Neuro surgery 2
Lecture 10 Neuro anesthesia

References:

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5. Devlin K: Textbook of Biochemistry with clinical applications 5th edition
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6. JAWETZ, Melnick & Adelberg: Medical Microbiology. 5th edition, LANGE