

STUDY GUIDE	
PROGRAM	2 nd year MBBS
COURSE TITLE	Head and Neck and Special Senses 2023
ACADEMIC YEAR	2023-2024
INTRODUCTION	<p>The head and neck and special senses is an introductory module that provides knowledge about the vital structures present in the head and neck region, their functions, and clinical co-relations. These include the head and skull, organs for special senses (eyes, ears, nose, tongue), cranial nerves, great vessels, and the thyroid gland. This module will give the students basic knowledge about the structures present in the head and neck region along with their important functions and abnormalities which can lead to various diseases.</p>
RATIONALE	<p>Trauma to the face & neck is associated with high mortality & morbidity. Injuries or pressure on the neck can threaten life by causing damage to the great vessels or the airways. Undergraduate students need to have basic knowledge about the structures and functions of this region which play a very essential role in the life of a human being. This will enable them to understand more advanced and complex issues when they go to the clinics, in the latter years.</p>
OUTCOMES	<p>By the end of the module, students will be able to:</p> <ul style="list-style-type: none"> describe the normal gross and microscopic structures and functions of the head and neck region describe the normal gross and microscopic structure and functions of the special sense organs correlate the structures present within the head and neck with their function with relevant abnormalities discuss balanced nutrition and various vitamins and minerals involved in maintenance of health
DEPARTMENTS INVOLVED	<p>Anatomy Biochemistry</p> <p>Physiology</p>
COURSE OBJECTIVES	<p>By the end of the module, the students will be able to:</p>
	<p style="text-align: center;"><u>LECTURES</u></p> <p style="text-align: center;"><u>ANATOMY</u></p> <p>1. <u>Bones of skull</u></p>

- Name parts of skeleton (axial and appendicular)
- Describe different bones and sutures of skull

2. Norma Frontalis, Verticalis & Fontanelles with their clinical correlation

- Name the different views (Norma) of skull
- Describe Norma verticalis and its features
- Identify the basic anatomical features of norma frontalis
- Name the different bony landmarks on norma frontalis
- Identify the sutures
- Relate the foramina with their respective contents
- Discuss the clinical importance of the fontanelles.

3. Pharyngeal apparatus & its anomalies

- Define pharyngeal arches, pouches, clefts and membranes
- Describe the derivatives of each arch (Muscle, bones, cartilage)
- Describe the fate of pouches, clefts and membranes
- Describe the common anomalies of pharyngeal apparatus

4. Scalp & its layers

- Describe the extent of scalp, five layers of scalp
- Discuss the nerves, vessels of scalp and their clinical correlates.

5. Norma Lateralis & occipitalis

- Identify basic anatomical features of the skull.
- Recognize different bony landmarks of norma lateralis & occipitalis.
- Identify the sutures.
- Relate the foramina with their respective contents.
- Relate the clinical significance of its bony features.

6. Development of face & its anomalies

- Define nasal placode, nasal pit & nasolacrimal groove.
- Describe the development of face.
- Describe formation of different parts of face from the prominences
- Discuss most common anomalies of face (cleft lip and associated cleft palate)

7. Face (Muscles, Nerves: Extra Cranial Part of V & VII)

- Describe the boundaries of face
- Enumerate the muscles and innervations of face
- Discuss the action of muscles of face
- Describe the blood supply of face
- Discuss the course and distribution of CNV and extra cranial part of CN VII
- Describe the disorders and applied anatomy of face (Bell's palsy)

8. Arteries, veins & lymphatic of face

- Describe the arterial supply of face.
- Discuss the major veins of face.
- Explain the lymphatic drainage of face
- Apply the basic clinical knowledge of face.

9. Norma Basalis

- List the bones forming the base of skull
- Describe anterior and middle part of base of skull
- Identify different foramina present at the base of skull
- Name the structures passing through these foramina

10. Gross anatomy of Mandible and Hyoid bone

- Identify different anatomical features of mandible.
- List attachments on each part of the mandible.
- Identify the foramen on the mandible.
- List the structures passing through these foramina.
- Enumerate the joints formed by mandible.
- Describe the ossification of mandible
- Discuss the applied anatomy of mandible
- Describe the location and vertebral level of hyoid bone
- Describe the parts of hyoid bone
- Explain the attachments on the hyoid bone

11. Parotid Gland and Parotid Region

- Describe the boundaries of the parotid region.
- Discuss shape, size and course of parotid duct.
- Discuss the facial nerve and its branches in the mass of parotid gland.
- Describe the secretion and function of parotid gland.
- Discuss the clinical complications, stone formation and parotitis.

12. Orbital cavity and its contents

- Describe the boundaries & content of orbital cavity.
- Enumerate the relations of orbital cavity.
- Describe location, relations and connections of ciliary ganglion.
- Discuss the disorders associated with ciliary ganglion.

13. Development of eye

- Describe the development of eye and formation of retina.
- Name the structures which develop from optic cup, neural crest cells and surface ectoderm.

- Explain the development of iris, ciliary bodies, lens, cornea, eyelid and lacrimal gland.
- Discuss the common congenital anomalies of eye.

14. Eyelid & Lacrimal Apparatus

- Discuss Eyelid and its parts.
- Explain the Innervation and blood supply of eyelids.
- Describe parts of lacrimal apparatus.
- Relate the diseases of lacrimal apparatus

15. Eyeball and Extraocular Muscles

- Explain the gross anatomical features of eyeball.
- Discuss different coats and compartment of the eyeball.
- Explain the neurovascular supply and lymphatic drainage of the eyeball.
- Enumerate the extra-ocular muscles.
- Discuss the attachments and nerve supply of these muscles.
- Explain the actions of Extraocular muscles.
- Discuss the related clinical anatomy.

16. Temporal Fossa & Temporomandibular Joint

- Describe the boundaries of temporal fossa.
- List the contents of temporal fossa.
- Describe the temporalis muscle, its innervations and action.
- Discuss the Temporomandibular joint, its type and its articular surfaces.
- Discuss the ligaments and movements performed at Temporomandibular joint.

17. Infratemporal Fossa & Pterygopalatine Fossa

- Describe the boundaries of Infratemporal fossa.
- List the contents of Infratemporal fossa.
- Describe the contents and boundaries of Pterygopalatine fossa.
- Explain the connections and location of Pterygopalatine ganglion.
- List the openings in Pterygopalatine fossa.

18. Cranial Nerves I to VI & its clinical correlation

- Explain the functional component and nuclei of these nerves.
- Describe the intra and extra cranial pathway.
- Describe the innervations of nerves.
- Explain the lesion of each cranial nerve.
- Discuss the clinical presentation of these lesions and their diagnostic tests.

19. Cranial Nerves VII to XII & its clinical correlation

- Discuss the functional components of cranial nerves VII to XII.
- Describe their course through the cranial cavity.
- Discuss the innervations of these nerves.
- Explain the lesion of each cranial nerve.
- Discuss the clinical presentation of these lesions and their diagnostic tests

20. Cervical Vertebrae

- Differentiate between the typical & atypical cervical vertebrae.
- Discuss the characteristic features of typical & atypical cervical vertebrae
- Describe the joints between the cervical vertebrae.
- Describe the movement which occur in the region of the cervical vertebrae.

21. Neck, Deep Cervical Fascia, carotid sheath and Platysma Muscle

- Discuss the layers of neck; skin superficial fascia and deep fascia
- Describe the cutaneous supply of skin of neck.
- Describe the different modifications of deep fascia.
- Describe prevertebral and pre-tracheal, investing layers of deep fascia.
- Explain the carotid sheath.
- List the contents of carotid sheath.
- Discuss the important relations of carotid sheath.
- Describe the platysma muscle, its innervations and action.

22. Anterior Triangle of Neck

- Discuss the division of triangles of neck.
- Name the subdivision of anterior triangle.
- Describe the boundaries and contents of sub divisions of anterior triangles i.e., Sub mental, Submandibular, Muscular & Carotid.

23. Submandibular region & Submandibular gland

- Describe the boundaries of Submandibular triangle.
- Name the contents of Submandibular triangle
- Describe the anatomy of Submandibular salivary gland.
- Describe the emergence and course of Wharton's duct.
- Describe the location & connections of Submandibular ganglion.
- Describe the location and area of drainage of Submandibular lymph nodes.

24. Gross Anatomy of thyroid & parathyroid gland

- Explain the gross anatomy of the thyroid & parathyroid gland.
- Discuss the blood supply and nerve supply of thyroid and parathyroid gland.
- Relate the clinical anatomy of thyroid and parathyroid gland with the relevant conditions.

25. Development of Thyroid, Parathyroid, Larynx and Thymus

- Describe the developmental anatomy of thyroid, parathyroid, larynx and thymus.
- Discuss congenital anomalies associated with their development.

26. Posterior triangle of neck, Cervical Plexus & Cranial Nerve XI

- Discuss the division of neck into anterior and posterior triangles.
- Describe the boundaries of posterior triangle of neck.
- List the contents of posterior triangle of neck.
- Discuss the formation, branches and functions of cervical plexus.
- Discuss the origin, course, branches and functions of cranial nerve XI.
- Discuss the clinical conditions associated with posterior triangle of neck, cervical plexus and cranial nerve XI.

27. Pharynx Including Tonsils

- Discuss the morphology, location and extent of pharynx
- Explain the division of pharynx into Nasopharynx, Oropharynx & Laryngopharynx.
- Describe the pharyngeal and palatine tonsils.
- Discuss the origin, insertion and actions of pharyngeal muscles.
- Discuss the innervation and blood supply of pharynx along with the associated clinical conditions.

28. Gross & Histology of larynx

- Explain the gross anatomy of larynx.
- Discuss the blood supply, nerve supply, and clinical anatomy of larynx.
- Describe the histological features of larynx.

29. Gross Anatomy of external nose, boundaries, blood & nerve supply

- Describe the features of external nose
- Name the boundaries of nasal cavity
- Describe the blood & nerve supply of nose
- Discuss the formation of anastomoses at little's area and its clinical importance

30. Histology of Nasal Cavity, respiratory & olfactory epithelia

- Discuss the epithelia of nasal cavity.
- Discuss the features of olfactory and respiratory epithelium.
- Describe the cells of olfactory and respiratory epithelium.

31. Para nasal air sinuses

- List the para nasal air sinuses.
- Describe their location, important relations, drainage and nerve supply.
- Discuss the clinical significance of para nasal air sinuses.

32. Development of nose & para nasal sinuses

- Describe development of different parts of nose and of para nasal sinuses
- Describe congenital anomalies associated with their development

33. Gross anatomy & Histology of oral cavity

- Discuss the boundaries and divisions of the oral cavity.
- Describe the vestibule and oral cavity proper with their contents.
- Describe the general features, classification, organization of oral mucosa.
- Discuss the type and components of oral epithelium.
- Discuss the histology of lips, cheek and gums.

34. Gross anatomy of tongue.

- Identify the gross anatomical features of the tongue.
- Describe the intrinsic muscles and extrinsic musculature of tongue and their movements.
- Discuss the blood supply, innervations and lymphatic of tongue.
- Relate the clinical conditions associated with it.

35. Development of Tongue & salivary glands

- Describe the development of the tongue.
- Discuss the congenital anomalies associated with the development of tongue.
- Explain the development of salivary glands.
- Discuss the derivation of secretory part, duct system and stroma from different embryonic structures.

36. Hard and Soft Palate

- Discuss the boundaries, muscle attachments and mucosal coverings of hard and soft palate.
- Discuss the function of hard and soft palate during process of mastication and deglutination.
- Discuss the blood supply and nerve supply of hard and soft palate.
- Discuss gag reflex and its complications after stroke.

37. Development of palate

- Describe palatal development during the seventh to ninth weeks of gestation.
- Explain the embryologic basis of cleft lip and palate.
- Discuss the types of cleft lip and palate.

38. Gross & Histology: External and Middle Ear

- Discuss the division of ear into external, middle and internal ear.
- Describe the parts of external ear, and the boundaries & content of middle ear cavity.
- Explain the histological features of parts of external and middle ear.
- Discuss the functions of external and middle ear as an organ for hearing.
- Define the clinical conditions associated with external and middle ear.

39. Gross & Histology: Internal Ear

- Describe the parts of internal ear.
- Describe the histological features of the parts of internal ear.
- Discuss the functions of internal ear as an organ for hearing and balance.
- Discuss the clinical conditions associated with internal ear.

40. Development of Ear

- Explain the development of external, middle and internal ear.
- Discuss congenital deafness and other anomalies of auricle, and rest of the ear.

41. Nerves & vessels of head and neck

- Describe the vessels of head & neck.
- Explain the following:
 - i. Cutaneous nerves of head and neck
 - ii. Formation of cervical nerves and its branches

42. Surface anatomy of head and neck (Facial Artery and Parotid Gland)

- Palpate the facial artery.
- Trace the course of facial artery in the face.
- Palpate the Parotid gland.
- Identify the landmarks of borders and surfaces of parotid gland.
- Trace the course and opening of parotid duct.

43. Integrated lecture on Auditory pathway

- Discuss the components of auditory pathway
- Describe the function of different parts of auditory pathway
- Describe the clinical conditions associated with auditory pathway
- Describe the vestibule and oral cavity proper with their contents

BIOCHEMISTRY

1. Introduction to nutrition

- Discuss nutrition, nutrients, BMI, RDA and RMR
- Discuss the biochemical importance of Balanced diet
- Discuss the basic food groups
- List the essential nutrients and their importance in the diet
- Discuss the dietary sources and recommendations of micronutrients
- Describe the importance and benefits of water
- Discuss the importance of dietary fibers
- Discuss the daily caloric requirements
- Discuss the Dietary Reference Intakes (EAR, RDA, AI, UL)
- Discuss the clinical disorders of nutrition

2. Nutritional importance of dietary carbohydrates

- Explain the biochemical importance of dietary carbohydrate
- Discuss Balanced diet
- Classify the types of dietary carbohydrates
- Discuss the significance of simple and complex dietary carbohydrates
- Explain the Glycemic index and Glycemic load
- Describe the biochemical complications of Obesity
- Discuss metabolic syndrome and its complications

3. Nutritional importance of dietary proteins

- Classify Protein according to their nutritional importance and give examples
- List the biochemical functions of proteins in the body
- Explain recommended dietary requirements of protein in different age groups
- Describe the Amino acid pool & Nitrogen balance
- Describe Protein energy malnutrition (Marasmus & Kwashiorkor)

4. Nutritional importance of dietary lipids

- Classify Lipids according to their nutritional importance and give examples
- Explain the biochemical functions of dietary lipids
- Discuss the sources and recommended daily allowance of dietary lipids
- Discuss the biochemical mechanism of development of atherosclerosis
- Discuss the clinical significance of dietary lipids (Metabolic syndrome, Atherosclerosis)

5. Vitamin A

- Explain the chemical structure of Vitamin A
- Classify the different types of Vitamin A
- Explain the biochemical functions of Vitamin A
- Discuss the role of vitamin A in visual cycle
- List the sources and daily requirement of Vitamin A
- Discuss the clinical significance of Vitamin A deficiency and toxicity

6. Overview of Dietary Minerals

- List and classify the dietary minerals with their biochemical importance
- Describe their sources and daily recommended allowances
- Explain their biochemical functions
- Discuss the clinical significance of mineral deficiency and toxicity

PHYSIOLOGY

1. Optics of eye

- Explain the fundamental physiology of eye & its refractive surfaces
- Discuss the basic principles of optics
- Describe the mechanism of accommodation & its control

2. Formation & circulation of aqueous humor

- Describe the formation and circulation of aqueous humor
- Explain the mechanism of regulation of intraocular pressure
- Define glaucoma & its types

3. Visual acuity & errors of refraction

- Define visual acuity
- Describe the errors of refraction (Myopia, hyperopia, astigmatism) & their correction by using different lens systems

4. Photo-transduction

- Describe the physiology of retinal layers
- Explain photochemistry of vision (rhodopsin – retinal cycle)
- Describe the mechanism of activation of Rods and cones

5. Visual pathway & its lesions

- Explain the neural circuitry of the Retina
- Describe the physiology of visual pathway
- Name the optic lesions associated with visual pathway

6. Eye movements & its control

- Explain the muscular control of eye movement
- Describe the fixation movements of eye
- Define accommodation reflex & pupillary light reflex

7. Sense of hearing, mechanism of hearing

- Describe the physiology of hearing & function of tympanic membrane & ossicular system
- Define impedance matching & attenuation reflex
- Explain the conduction of sound waves in the cochlea

- Describe the function of the organ of Corti

8. Auditory pathway

- Explain the auditory nervous pathway & abnormalities associated with it
- Describe the function of cerebral cortex in hearing

9. Sense of Taste

- Describe the primary sensations of taste and associated disorders
- Explain the mechanism of taste perception and its transmission into central nervous system

10. Sense of Smell

- Mention the primary sensations of smell and associated disorders
- Describe the stimulation of olfactory cells & its transmission into central nervous system

RESEARCH METHODOLOGY 1

1. Identify the problems related to health in the community
2. Write a research question and hypothesis
3. Perform literature search by following a scientific method
4. Write the background which should lead to the rationale for the study
5. Explain the basic study designs used in research

TUTORIALS

BIOCHEMISTRY

1. Balanced diet

- Discuss the clinical importance of balanced diet
- Interpret clinical conditions correlated with their laboratory investigations

2. Vitamin A

- Discuss the clinical importance of vitamin A
- Interpret clinical conditions correlated with their laboratory investigations

3. Deficiencies of minerals (e.g. Iron, calcium)

- Discuss the clinical importance of minerals
- Interpret clinical conditions correlated with their laboratory investigations

	<p>4. <u>Obesity</u></p> <ul style="list-style-type: none"> • Discuss the clinical importance of Obesity • Interpret clinical conditions correlated with their laboratory investigations <p>5. <u>Protein Calorie Malnutrition (PCM), Marasmus and Kwashiorkor</u></p> <ul style="list-style-type: none"> • Discuss the clinical importance of PCM, Marasmus and Kwashiorkor • Interpret clinical conditions correlated with their laboratory investigations <p>6. <u>Metabolic syndrome, Atherosclerosis</u></p> <ul style="list-style-type: none"> • Discuss the clinical importance of Metabolic syndrome & Atherosclerosis • Interpret clinical conditions correlated with their laboratory investigations
PRACTICALS	<p style="text-align: center;"><u>ANATOMY</u></p> <p>1. <u>Histology of Eye Ball</u></p> <ul style="list-style-type: none"> • Identify the histological features of eyeball • Describe the histological feature of each coat of eye ball • Describe the histology of cornea and lens • Discuss the arrangement and composition of the layers of retina <p>2. <u>Histology of salivary gland:</u></p> <ul style="list-style-type: none"> • Identify the histological slide of salivary gland • Describe the histological appearance of salivary gland • Describe the different types of acini <p>3. <u>Histology of Nasal Cavity, respiratory & amp; olfactory epithelia</u></p> <ul style="list-style-type: none"> • Identify various parts on slides • Describe histological characteristics of each part <p>4. <u>Histology of Tongue:</u></p> <ul style="list-style-type: none"> • Identify the microscopic slide of tongue • Identify the characteristic features of tongue under microscope. • Describe the different layers of tongue. • Describe different types of lingual papillae • Describe filiform, fungiform, circumvallate papillae and foliate papillae • Describe different glands of tongue <p>5. <u>Histology: Ear (External, Middle, Internal)</u></p> <ul style="list-style-type: none"> • Identify the various parts, gross and microscopic • Explain the characteristic features of each part/ section

- Identify the various parts, gross and microscopic
- Explain the characteristic features of each part/ section

BIOCHEMISTRY

1. Calculation of Body Mass Index (BMI)

- Explain the significance of calculation of Body Mass Index
- Explain the method to calculate BMI
- Calculate the BMI
- Interpret the significance of the calculated BMI
- Interpret clinical conditions correlated with their laboratory investigations

2. Interpretation of glycemic index

- Define Glycemic Index and Glycemic Load
- Compare the Glycemic index of different carbohydrates
- Interpret the significance of GI & GL
- Outline the method for calculation of GI of various food items
- Interpret clinical conditions correlated with their laboratory investigations

PHYSIOLOGY

1. Visual acuity & color vision

- Determine the visual acuity using Snellen's chart
- Examine the color vision of a subject using Ishihara eye chart
- Discuss the errors in visual acuity and color vision

2. Perimetry

- Describe various parts of Perimeter and their uses
- Determine the normal fields of vision using perimeter
- Interpret perimeter chart of a patient and mention any abnormality is present
- Define physiological blind spot.

3. Hearing test

- Describe the principles of various tuning fork tests: Rinne, Weber and Schwabach tests.
- Elaborate bone conduction and air conduction
- Identify conductive and sensorineural deafness based on the result and interpretation of various tuning fork tests

4. Sense of Smell

- Identify the smell of various given substances
- Discuss the abnormalities associated with perception of smell

	5. <u>Sense of Taste</u> <ul style="list-style-type: none"> • Identify the taste of various given substances • Discuss the abnormalities associated with sense of taste
INTERNAL ASSESSMENT	<ul style="list-style-type: none"> • It may be in the form of MCQs, assignments, stages/sub-stages, projects, quiz or OSPE. • Continuous monitoring of attendance and practical assessment in short groups • Internal evaluation carries 20% weightage in summative examination
ANNUAL EXAMINATION	MCQs and OSPE (observed + un-observed)