## Introduction

The head and neck module is a basic introductory module which leads to the integration of basic and clinical knowledge. Many important organs are in this region. Current understanding of the knowledge of these organs will help students link structure with function and disease. The head and neck region plays a vital role in human life. The head houses brain & is the seat of intelligence, cognition and perception. The skull houses vital sensory organs. Great vessels traverse the neck region and supply the brain. The Thyroid & Parathyroid glands in neck contribute towards the quality of life. Cranial nerves in this region have a pivotal role and they supply face, head & neck region. Trauma to the face & neck is associated with high mortality & morbidity. Injuries or pressures on the neck can cause massive bleeding by the great vessel, compromising the airways & threatening life. Therefore, learners need to have in-depth knowledge not only of the structures but also of their functions and malfunctions.

## Rationale

Organs in this region play very vital role in the life of a human being. It is important for undergraduate students of medicine to have basic knowledge about the structure, function & biochemical aspects as well as diseases of these vital organs so that they understand how diseases and morbidity arise. Knowledge of these conditions will help the learners understand more advanced and complex issues when they go to the clinics.

## Target Students

Second year M.B.B.S.

## Duration

5 weeks

## Module Outcomes

By the end of the module, students will be able to:

- Describe the normal gross and microscopic structure and functions of the head and neck region
- Correlate normal structure and functions of the various structures of head and neck with etiology and pathogenesis of the related disease conditions
- Discuss balanced nutrition and various vitamins and minerals involved in maintenance of health
- Initiate research synopsis based on prescribed protocols

## Departments

Anatomy, Physiology, Biochemistry, Pathology, Community Medicine.

## Objectives

By the end of the module, students will be able to:

## Anatomy

Orientation of Skull & fontanelles with their clinical correlation & Norma verticalis
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<table>
<thead>
<tr>
<th>Topic</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name parts of skeleton (axial and appendicular)</td>
<td>Describe different bones, sutures of skull</td>
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<tr>
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<td>Name the different views (Norma) of skull</td>
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<tr>
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<td>Describe Norma verticalis and its features</td>
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<tr>
<td><strong>Norma Frontalis</strong></td>
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</tr>
<tr>
<td>Identify the basic anatomical features of norma frontalis</td>
<td>Name the different bony landmarks on norma frontalis</td>
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<tr>
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<td>Identify the sutures and relate the foramina with their respective contents.</td>
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<tr>
<td><strong>Pharyngeal Apparatus &amp; its anomalies:</strong></td>
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</tr>
<tr>
<td>Define Pharyngeal arches, pouches, clefts and membranes.</td>
<td>Describe the derivatives of each arch (Muscle, bones, cartilage)</td>
</tr>
<tr>
<td>Describe the derivatives of each arch (Muscle, bones, cartilage)</td>
<td>Describe the fate of pouches, clefts and membranes.</td>
</tr>
<tr>
<td>Describe the fate of pouches, clefts and membranes.</td>
<td>Describe the common anomalies of pharyngeal apparatus</td>
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<tr>
<td><strong>Scalp &amp; its layers</strong></td>
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<tr>
<td>Describe the extent of scalp, five layers of scalp</td>
<td>Describe the nerves and vessels of scalp and their clinical correlates</td>
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<tr>
<td>Describe the nerves and vessels of scalp and their clinical correlates</td>
<td><strong>Norma Lateralis</strong></td>
</tr>
<tr>
<td>Identify basic anatomical features of the skull</td>
<td>Recognize different bony landmarks of the skull</td>
</tr>
<tr>
<td>Recognize different bony landmarks of the skull</td>
<td>Identify the sutures and relate the foramina with their respective contents.</td>
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<tr>
<td><strong>Development of Face with Anomalies</strong></td>
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</tr>
<tr>
<td>Define nasal placode and nasal pit &amp; nasolacrimal groove</td>
<td>Describe the development of face.</td>
</tr>
<tr>
<td>Describe the development of face.</td>
<td>Describe formation of different parts of face from the prominences.</td>
</tr>
</tbody>
</table>
- Discuss most common anomalies of face (cleft lip and associated cleft palate)

**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)

**Arteries and Veins & Lymphatic of Face**
- Describe the arterial supply of face, the major veins of face and formation and fate of retromandibular vein.
- Explain the lymphatic drainage of face
- Discuss the clinical correlation (Danger area of face)

**Orbital Cavity and Its Contents**
- Describe the boundaries & content of orbital cavity
- Describe location, relations and connections of ciliary ganglion.
- Define the disorders associated with ciliary ganglion.
- Enumerate the relations of orbital cavity

**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

**Eyelid & Lacrimal Apparatus**
<table>
<thead>
<tr>
<th><strong>Eye Ball and Extraocular Muscle</strong></th>
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<tbody>
<tr>
<td>Discuss Eyelid and its parts</td>
</tr>
<tr>
<td>Explain the Innervation and blood supply of eyelids.</td>
</tr>
<tr>
<td>Describe parts of lacrimal apparatus.</td>
</tr>
<tr>
<td>Define the diseases of lacrimal apparatus.</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Eye Ball and Extraocular Muscle</strong></th>
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<tbody>
<tr>
<td>Identify the histological features of eyeball.</td>
</tr>
<tr>
<td>Describe the histological feature of each coat of eye ball.</td>
</tr>
<tr>
<td>Describe the histology of cornea and lens.</td>
</tr>
<tr>
<td>Discuss the arrangement and composition of the layers of retina.</td>
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<table>
<thead>
<tr>
<th><strong>Norma Occipitalis &amp; posterior part of Basalis</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>List the Bones forming the posterior aspect &amp; base of skull</td>
</tr>
<tr>
<td>Narrate the details of posterior part of base of skull.</td>
</tr>
<tr>
<td>Different foramina &amp; structures passing through them.</td>
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</table>

<table>
<thead>
<tr>
<th><strong>Development of eye</strong></th>
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<tbody>
<tr>
<td>Describe the development of eye and formation of retina.</td>
</tr>
<tr>
<td>Name the structures which develop from optic cup, neural crest cells and surface ectoderm.</td>
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<table>
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</table>
|   | Explain the development of iris, ciliary bodies, lens, cornea, eyelid and Lacrimal gland  
|   | Discuss the common congenital anomalies of eye.  

**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.  

**Histology of Nasal Cavity, respiratory & olfactory epithelia**

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

**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  

**Development of nose & Para nasal sinuses**

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

**Gross & Histology: External and Middle Ear**

- Discuss the division of ear into external, middle and internal ear.  
- Describe the parts of external ear, 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.

**Gross & Histology: Internal Ear**

- Describe the parts of internal ear.
- Describe the histological features of 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.

**Development of Ear**

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

**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.

**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.

**Gross Anatomy of Mandible and Hyoid Bone**

- Describe parts of mandible.
- List attachments on each part of the mandible.
- Describe the foramen on the mandible and passage of the structures 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.

**Temporal Fossa & Temporomandibular Joint**
- Describe the boundaries of temporal Fossa
- List the contents of temporal Fossa
- Describe the temporalis muscle, its innervations and action.
- Describe the Temporomandibular joint, its type and its articular surfaces.
- Describe the ligaments attached at and movements performed at Temporomandibular joint

**Infratemporal Fossa & Pterygopalatine Fossa**
- Describe the boundaries of Infratemporal Fossa
- List the contents of Infratemporal Fossa
- Describe the contents and boundaries of Pterygopalatine Fossa
- Discuss Pterygopalatine ganglion and its connections
- List the openings in Pterygopalatine Fossa

**Cranial Nerves VII to XII & its clinical correlation**
- Regarding cranial nerves VII to XII, the student should be able to describe:
  i. the functional components of these nerves.
  ii. their course through the cranial cavity.
  iii. the innervations of these nerves.
  iv. the lesion of each cranial nerve.
  v. the clinical presentation of these lesions and their diagnostic tests.

**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.

### 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 and the clinical associated to it.

### 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.

### Development of Tongue & salivary glands

- Describe the development of the tongue.
- Discuss the congenital anomalies associated with the development of tongue.
- Name the beginning of development of the 3 salivary gland.
- Discuss the derivation of secretory part, duct system and stroma from different embryonic structures.

### 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.

**Neck, Deep Cervical Fascia, carotid sheath and Platysma Muscle:**
- Define the layers of neck; skin superficial fascia, deep fascia
- Describe the cutaneous supply of skin of neck
- Describe the different modifications of deep fascia
- Describe prevertebral, pre-tracheal, investing layers of deep fascia
- Explain the carotid sheath
- List the contents of carotid sheath & its important relations
- Describe the platysma muscle, its innervations and action

**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

**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

**Posterior Triangle of Neck, Cervical Plexus & Cranial Nerve XI**
- Briefly 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.
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| 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. |

**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 innervations and blood supply of pharynx along with the associated clinical conditions.

**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

**Gross & histology of larynx**

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

**Development of Thyroid, Parathyroid, Larynx And Thymus**

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

### Venous & lymphatic drainage of head & neck
- Describe the following:
  i. Internal jugular veins and its tributaries
  ii. Cervical lymph node
  iii. Tonsillar lymph node
  iv. Supraclavicular lymph node

### Cervical vertebrae:
- Describe the features and joints formed by cervical vertebrae.
- Differentiate between typical & atypical cervical vertebrae

### Surface Anatomy of Head and Neck (Facial Artery and Parotid Gland)
- Identify and palpate the Facial artery.
- Trace the course of facial artery in the face.
- Identify and palpate the Parotid gland.
- Identify the landmarks of borders and surfaces of parotid gland.
- Trace the course and opening of parotid duct.

### BIOCHEMISTRY
- Introduction to nutrition, Balanced diet, BMI, RD
<table>
<thead>
<tr>
<th>PHYSIOLOGY</th>
<th>Optics Of Eye</th>
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<tbody>
<tr>
<td></td>
<td>• Explain the basic physiology of eye &amp; its refractive surfaces.</td>
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<td>• Discuss the physical principles of optics.</td>
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<th>JINNAH SINDH MEDICAL UNIVERSITY</th>
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<tbody>
<tr>
<td>• Discuss the overview of nutrition biochemical importance of Balanced diet, explanation of BMI and RDA</td>
</tr>
</tbody>
</table>

**Overview of vitamins**
- Classify vitamins
- List their main diet sources.

**Vitamin A & visual cycle**
- Explain the biochemical importance of vitamin A and its role in visual cycle.

**Overview & biochemical importance of minerals**
- Discuss minerals their biochemical importance. Assimilation in human body with related functions and abnormalities.

**Importance of dietary carbohydrates (Glycemic index, obesity & Glycemic load)**
- Explain the biochemical importance of dietary carbohydrate (glycemic index, Obesity & glycemic load).

**Importance of dietary protein (PCM, Marasmus, Kwashiorkor)**
- Explain the biochemical importance of dietary protein (PCM, Kwashiorkor)

**Importance of dietary lipids (Metabolic syndrome, Atherosclerosis)**
- Explain the biochemical importance of dietary lipid (metabolic syndrome, Atherosclerosis)
<table>
<thead>
<tr>
<th><strong>Visual Acuity &amp; Errors Of Refraction</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Define visual acuity.</td>
</tr>
<tr>
<td>• Describe the errors of refraction (Myopia, hyperopia, astigmatism &amp; their correction by using different lens systems).</td>
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<thead>
<tr>
<th><strong>Formation &amp; circulation of aqueous humor.</strong></th>
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<tbody>
<tr>
<td>• Describe the formation and circulation of aqueous humor.</td>
</tr>
<tr>
<td>• Explain the mechanism of regulation of intraocular pressure.</td>
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<tr>
<td>• Define glaucoma &amp; its treatment.</td>
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<tr>
<th><strong>Photo-transduction</strong></th>
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<tbody>
<tr>
<td>• Describe the physiology of retinal layers</td>
</tr>
<tr>
<td>• Explain photochemistry of vision (rhodopsin - retinal)</td>
</tr>
<tr>
<td>• Describe the mechanism of activation of Rods.</td>
</tr>
<tr>
<td>• Explain the photochemistry of color vision</td>
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<thead>
<tr>
<th><strong>Visual Pathway &amp; Its Lesion</strong></th>
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<tbody>
<tr>
<td>• Explain the neural circuitry of the Retina.</td>
</tr>
<tr>
<td>• Describe the physiology of visual pathway.</td>
</tr>
<tr>
<td>• Name the optic lesion associated with visual pathway.</td>
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<tr>
<th><strong>Eye movements &amp; its control.</strong></th>
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<tbody>
<tr>
<td>• Explain the muscular control of eye movement.</td>
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<tr>
<td>• Describe the fixation movements of eye.</td>
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<tr>
<td>• Define accommodation reflex &amp; pupillary light reflex.</td>
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<tr>
<th><strong>Sense of hearing &amp; its mechanism</strong></th>
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<tr>
<td>• Describe the physiology of hearing &amp; function of tympanic membrane &amp; ossicular system.</td>
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</tbody>
</table>
### Auditory Pathway
- Explain the auditory nervous pathway & abnormalities associated with it.
- Describe the function of cerebral cortex in hearing.

### Sense of Taste & Smell
- List the primary sensation of taste.
- Explain the mechanism of taste perception and its transmission into central nervous system
- List the primary sensation of smell.
- Describe the stimulation of olfactory cells & its transmission into central nervous system.

### Inflammatory and Non Neoplastic Lesions of Oral Cavity & Salivary Glands
- Discuss the etiology, pathogenesis and morphology of: Dental caries, Gingivitis, Periodontitis, Aphthous ulcers, irritation fibroma, Pyogenic, granuloma, peripheral ossifying fibroma and peripheral giant cell granuloma.
- Explain the pathogenesis and morphological features of Herpes Simplex Virus infection, Oral candidiasis, Hairy Leukoplakia and oral manifestations of systemic diseases.
- Discuss the precancerous lesions of oral cavity i.e. Leukoplakia & Erythroplakia.
- Discuss the etiology and pathogenesis of xerostomia, sialadenitis, Mucocele, Ranula, and Sialolithiasis.

### Inflammatory and Non Neoplastic Lesions of Nasopharynx and Larynx
- Discuss the etiology and pathogenesis of various types of Rhinitis.
- Discuss the etiology, pathogenesis and morphology of Nasal polyps, pharyngitis and tonsillitis.
### Community Medicine

**Introduction to Environmental Health**
- Describe the concept of environmental health
- Discuss the concept of environmental degradation & environmental distress syndrome
- Explain the concept of urbanization, their effects on health & environment
- Discuss the control & preventive measures of environmental degradation

**Air Pollution**
- Describe the concept of air pollution
- Identify the sources of air pollution
- Explain the effects of air pollution on health
- Discuss the concept of greenhouse effects, global warming and ozone depletion
- Discuss the method to control air pollution

**Water Purification**
- Define water purification
- Identify methods of water purification
- Explain WHO standards for water safety

**Water Pollution & Water Related Diseases**
- Describe the concept of water pollution
- Identify the sources of water pollution
- Explain the effects of water pollution on health
- Discuss the method to control water pollution
**Waste Disposal**
- Describe Waste Disposal
- Discuss different methods of waste disposal

**Noise Pollution**
- Describe the concept of noise pollution
- Identify the sources of the noise pollution
- Explain the effects of noise pollution on health and environment
- Discuss the control and prevention of noise pollution

**Hospital waste management**
- Describe the concept of hospital waste management
- Differentiate hazardous & nonhazardous waste
- Identify the source of hospital waste
- Determine the effects of hospital waste on health and environment
- Discuss the waste management plan

**Nuclear Medicine**
- Describe Nuclear Medicine
- List types of Nuclear Medicine
- Discuss Importance of Nuclear Medicine
- Discuss advantages & disadvantages of Nuclear Medicine

**Mental Health**
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<tr>
<td><strong>RESEARCH</strong></td>
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<tr>
<td>- Describe Mental Health</td>
</tr>
<tr>
<td>- List Mental Health Problems</td>
</tr>
<tr>
<td>- Explain Prevention and Control of Mental health problems.</td>
</tr>
<tr>
<td><strong>Introduction to Research</strong></td>
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<tr>
<td>- Define research</td>
</tr>
<tr>
<td>- Appreciate the importance of research</td>
</tr>
<tr>
<td>- Identify the high priority areas for health research</td>
</tr>
<tr>
<td>- List steps of research</td>
</tr>
<tr>
<td>- Describe the ethics of research</td>
</tr>
<tr>
<td><strong>How to Formulate a Research Question</strong></td>
</tr>
<tr>
<td>- Define research and its importance</td>
</tr>
<tr>
<td>- List a research question</td>
</tr>
<tr>
<td>- List characteristics of a good research question</td>
</tr>
<tr>
<td><strong>Hypothesis, its types and Errors in Hypothesis Testing</strong></td>
</tr>
<tr>
<td>- Define hypothesis and state its importance</td>
</tr>
<tr>
<td>- Identify the null and alternative hypotheses</td>
</tr>
<tr>
<td>- Describe the importance of alpha and beta errors</td>
</tr>
<tr>
<td>- Discuss the basis for accepting or rejecting the null hypothesis</td>
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<tr>
<td><strong>PRACTICALS</strong></td>
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<tr>
<td>- <strong>ANATOMY</strong></td>
</tr>
<tr>
<td>- <strong>Eyelid, Conjunctiva &amp; Lacrimal apparatus</strong></td>
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<tr>
<td>- Describe the histological features of eyelid, conjunctiva and lacrimal apparatus.</td>
</tr>
<tr>
<td>- Identify these features in slide.</td>
</tr>
<tr>
<td>- Describe different glands present in eyelid.</td>
</tr>
<tr>
<td>- Describe the reflection of conjunctiva.</td>
</tr>
<tr>
<td>- Describe the lining epithelium of conjunctiva</td>
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<tr>
<td>Description</td>
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<tr>
<td>Describe the structure of acini in Lacrimal gland.</td>
</tr>
<tr>
<td>Describe the duct system of Lacrimal gland.</td>
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</tbody>
</table>

**Histology of Tongue & olfactory epithelium:**
- Identify the microscopic slide of tongue & olfactory epithelium.
- Identify tongue & olfactory epithelium based on histology.
- 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.

**Histology of salivary gland:**
- Identify the histological slide of salivary gland.
- Describe the histological appearance of salivary gland.
- Describe the different types of acini.

**Histology of thyroid & parathyroid gland:**
Identify the histological slide of thyroid & parathyroid gland.

Identify different type of cells.

**BIOCHEMISTRY**

**Calculation of BMI**
- Calculate the BMI and interpret its significance.

**Interpretation of glycemic index**
<table>
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<tr>
<td>• Comparison of the glycemic index of different carbohydrates and interpretation of its significance.</td>
</tr>
</tbody>
</table>

**PHYSIOLOGY**

**Perimetry.**
- describe various parts of Perimetry
- perform the technique of plotting visual field.
- explain the clinical application of Perimetry to identify lesions of visual pathway using this method
- Interpret perimeter chart of a patient be able to tell any abnormality if present.
- List the various parts of perimeter and their use
- Demonstrate the method of plotting the usual field of individual eye + necessary precautions to be taken.
- Interpret a given perimeter chart.
- Explain the visual pathway
- Enumerate lesions of the visual pathway by performing Perimetry.

**Visual acuity**
- Perform visual acuity using Snellen’s eye chart in a subject provided.
- Define visual acuity
- Interpret the visual acuity recording using Snellen’s eye chart.
- List other methods of recording visual acuity
- Demonstrate the refractive errors and their correction.
- Examine the color vision of a subject using Ishiara eye chart.
- Discuss the errors in color vision.

**Smell and taste**
- List the basic sensation of smell
- Examine the sense of smell in a subject provided
- Identify the abnormalities associated with perception of smell.
- Map the pathway of sense of smell.
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<tr>
<th><strong>JINNAH SINDH MEDICAL UNIVERSITY</strong></th>
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<tr>
<td>• List the basic modalities of taste</td>
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<td>• Examine the senses of taste on the gives samples.</td>
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<tr>
<td>• Explain taste pathways</td>
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<td>• Identify the abnormalities associated with sense of taste.</td>
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**Hearing test**

• Explain the mechanism of hearing and auditory pathway
• Describe the principle of various tuning fork tests
• Demonstrate the performance of Rinne’s, Weber’s & ABC tests & precautions needed to be observed.
• Identify conductive and sensorineural deafness based on the result and interpretation of various tuning fork tests.

**Internal Assessment:**

• Continuous monitoring of attendance and practical assessment in short groups.
• It may be in the form of MCQs, assignments, stages/sub-stages, projects, quiz or OSPE.
• Internal evaluation carries 20% weightage in summative examination.

**Summative Examination**

MCQs and OSPE (observed + un observed stations).