



# Bachelor of Dental Surgery

1<sup>st</sup> BDS course book - 2016



**Faculty of Dental Sciences**

**University of Peradeniya**

## **INTRODUCTION**

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The study program leading to the Bachelor of Dental Surgery is conducted entirely in English. While the Intensive Program was mostly intended to ensure that you reach a minimum level of competency needed to follow classes in the English medium, further teaching will be continued throughout the first year to help you to improve your language skills. Attending these classes is very important as you are required to pass the examination for proficiency in English Language, conducted by the English Language Teaching Unit, which is a requirement for obtaining the final BDS degree.

The first year program is mainly dedicated to basic biomedical sciences which help you to gain a general understanding of the human body and how it functions normally. This is a component of learning that may be considered the foundation for the study of Dentistry and is essential before you start training in clinical dentistry. The disciplines that deal with this area of study include Anatomy, Physiology, Biochemistry, and Dental Anatomy. At the Faculty of Dental Sciences, of the University of Peradeniya, these divisions of study are combined to make the Department of Basic Sciences.

While Anatomy deals with the naked-eye and the microscopic appearance and structure of the human body, Physiology provides an understanding of its function. The study of the function of the body at an organ and cellular level is called Biochemistry, and includes Food and nutrition and some chemical reactions that occur in the human tissues, and their role in health and illness. Dental Anatomy is the study of all aspects of the human dentition, while Oral Biology includes the study of the rest of mouth and surrounding areas. You will gain an evolutionary view of the development of the human dentition, through a limited amount of comparative Dental Anatomy, which compares it with the teeth and jaws of different groups of animals. These disciplines are not taught as individual subjects, but are integrated into modules and courses dealing with specific topics.

You will also be introduced to the techniques of clinical examination and medical statistics during this year.

On the whole, the first year study program is planned to provide you with a fundamental grounding in basic biomedical sciences, which you will need in preparation for studying and practicing Dentistry safely in the treatment of patients.

### **Structure of the teaching programme in Basic Sciences**

The curriculum in the Basic Sciences consists of 18 courses. Each course is identified by a title. A course notation is also used for convenient reference in time tabling and planning the programme

The Basic Sciences teaching programme is conducted over two semesters during the first year of your program and consists of lectures, practical classes, tutorials and dissections. You will have to study 9 courses during each semester. Dissection of the Thorax and Abdomen will be done in the first semester; the Head and Neck will begin in the first semester and completed in the second semester.

**Table 1 : Structure of the Basic Sciences Teaching Programme**

<b>Semester</b>	<b>Notation</b>	<b>Courses</b>	<b>Credit Value</b>
<b>1</b>	BS 1101	Cell Biology, Molecular Genetics & Metabolism	4.0
	BS 1102	Body Fluids, Medical Literature and Statistics	2.5
	BS 1103	Tissues of the Body	3.0
	BS 1104	General Developmental Biology	1.0
	BS 1105	Teeth and Supporting Structures	3.5
	BS1106	Cardiovascular System	2.0
	BS 1107	Respiratory System	2.0
	BS 1108	Gastrointestinal System	2.0
	BS 1109	Anatomy (Thorax and abdomen)	2.0
<b>2</b>	BS 1110	Anatomy (Head and Neck)	2.0
	BS 1201	Food and Nutrition	2.5
	BS 1202	Endocrinology	2.0
	BS 1203	Oral Biology	4.0
	BS 1204	Urinary System	2.0
	BS 1205	Reproductive System	1.5
	BS 1206	Nervous System	5.0
	BS 1207	Special Senses	2.5
	BS 1208	Host Defense	2.0

***Time Table***

You will be given a separate timetable for each semester.

***Student assessment***

You will be assessed separately for each course at the end of semester examination. The theory component will be assessed

in a written examination consisting of Short Answer Question (SAQ's) and Multiple Choice Questions (MCQ's). The practical component of courses will be assessed using a spot-type /Objective Structured Practical Examination. The number of spots will depend on the number of units in the practical component of each course.

The total mark for each course is calculated as a percentage, based on which a letter grade and a Grade Point is awarded for each course.

<b>Letter Grade</b>	<b>Grade Point</b>
A+	4.0
A	4.0
A-	3.7
B+	3.3
B	3.0
B-	2.7
C+	2.3
C	2.0
C-	1.7
D+	1.3
D	1.0
E	1.0

A level Grade of C- or less is considered as fail and should be upgraded.

There are no special re-sit examinations. Students failing a course

have to re-sit the relevant examination at the next first available opportunity, the following year. A maximum of 4 attempts (including the first) are allowed to pass any given course. The highest grade awarded for a course in re-sit attempt will be grade letter C.

First Examination for the Bachelor of Dental Surgery Degree (1<sup>st</sup> BDS) is the combined results of both semester 1 and semester 2 examinations. At the end of the second semester examination a grade Point Average (GPA) is calculated as the weighted average of grade Points of all the Basic Sciences courses according to the following formula.

$$\text{GPA} = \frac{\sum G_i C_i}{\sum C_i}$$

Where  $G_i$  = Grade Point of the  $i^{\text{th}}$  course

$C_i$  = Number of units of the  $i^{\text{th}}$  course

Classes will be awarded according to the level of performance based on the GPA as follows:

<b><u>Level of performance</u></b>	<b><u>GPA</u></b>
First class	$\geq 3.7$
Second Class (Upper)	3.3 – 3.6
Second Class (Lower)	2.7 – 3.2
Pass	2.0 – 2.9

The First Examination for the Bachelor of Dental Surgery Degree is a partial bar. Only those students who pass a minimum of eight (08)

Basic Sciences courses permitted to enter the second year teaching programme.

***Please refer the students hand book for examinations by-laws of the Faculty of Dental Sciences and regulations relating to examination procedure, offences & punishments for examinations conducted under the semester-based course unit system.***

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# **1<sup>st</sup> Semester**

# **Cell Biology, Molecular Genetics & Metabolism (BS 1101)**

**The aim of this module is to provide a comprehensive knowledge and understanding of the cell and its functions.**

## **Unit I: Cell Biology & Metabolism**

The aim of this unit is to provide a comprehensive knowledge and understanding on the following aspects of cell biology:

- 1. Structure of the cell**
- 2. Functions of cell organelles**
- 3. Cell division**
- 4. Chemical constituents of the cell and their functions**
- 5. Enzymology**
- 6. Carbohydrate metabolism**
- 7. Protein metabolism**
- 8. Lipid metabolism**

## Objectives

### 1. Structure of the cell

- \* Outline the features of eukaryotic cells, prokaryotic cells and viruses
- \* Draw and label the basic light microscopic and electron microscopic appearance of a eukaryotic cell
- \* Draw and label the molecular structure of the cell membrane

### 2. Functions of cell organelles

- \* Describe the functions of the nucleus  
nucleoli  
rough endoplasmic reticulum  
smooth endoplasmic reticulum  
mitochondria  
lysosomes  
golgi apparatus  
ribosomes
- \* List the functions of - microfilaments  
microtubules  
intermediate filaments
- \* Describe the transport mechanisms of the cell membranes
- \* Describe the development and maintenance of resting membrane potentials
- \* Discuss the development and biological significance of action potentials

### **3. Cell division**

- \* Explain the mitotic cell division
- \* Explain the meiotic cell division
- \* Discuss the biological significance of cell division

### **4. Chemical constituents of the cell and their functions**

- \* List the major chemical constituents of the cell
- \* Describe the basic biochemical structure, functions and biological significance of -  
carbohydrates  
proteins  
lipids
- \* Carry out biochemical tests for -  
carbohydrates  
proteins  
lipids

### **5. Enzymology**

- \* List the different classes of enzymes
- \* Explain the terms co-enzyme, co-factor, prosthetic group, co-valent modifications and allosteric modifications
- \* Describe the effect of enzyme concentration, substrate concentration, PH and temperature on enzyme activity
- \* Explain the mechanism of competitive, non competitive, reversible and irreversible inhibition of enzyme activity
- \* Explain the importance of enzymes in clinical practice

### **6. Carbohydrate metabolism**

- \* Explain the catabolism of glucose under aerobic and anaerobic conditions -  
glycolysis  
tricarboxylic acid cycle/ Krebs's cycle  
electron transport chain

- \* Explain glycogenesis and glycogenolysis and their regulation
- \* Discuss the synthesis of lactose
- \* Discuss the inter-conversion of glucose, fructose and galactose and synthesis of lactose
- \* Explain gluconeogenesis and its regulation
- \* Explain the effect of carbohydrate deprivation on metabolism

## **7. Protein metabolism**

- \* Recall protein synthesis
- \* Explain the catabolism of proteins and amino acids
- \* Explain the conversion of amino acids into urea

## **8. Lipid metabolism**

- \* Explain the synthesis of fatty acids and lipids
- \* Explain lipolysis in the adipose tissue
- \* Explain catabolism of fatty acids
- \* Explain the metabolism of cholesterol -
  - synthesis
  - transport
  - breakdown
  - excretion
  - atherosclerosis

## **Unit II:Molecular Genetics**

The aim of this unit is to provide a broad introduction to the following aspects of human genetics:

- \* Molecular basis of genetics
- \* Genetic code and protein synthesis
- \* Genetic disorders and their diagnosis
- \* Principles and applications of genetic engineering
- \* Principles and application of molecular biology in clinical practice

### **Objectives**

#### **9. Molecular basis of genetics**

- \* Explain structure and function of chromosomes and genes
- \* Describe the structure of DNA
- \* Describe the structure of RNA
- \* Outline the methods of chromosome analysis
- \* Outline the isolation and analysis of human DNA

#### **10. Genetic code and protein synthesis**

- \* Describe the genetic code
- \* Describe RNA transcription
- \* Discuss the control of gene expression
- \* Describe protein synthesis -
  - initiation
  - elongation
  - termination

## **11. Genetic disorders and their diagnosis**

- \* List the important genetic disorders-
  - Haemophilia
  - Christmas disease
  - Thalassaemia
  - G-6-PD deficiency
  - Abnormal Hb- Sickle cell Anaemia
  - Downs syndrome
  - Colour blindness
- \* Describe genetic disorders of teeth-
  - Amelogenesis imperfecta
  - Dentinogenesis imperfecta
- \* Discuss the inheritance patterns of genetic disorders
- \* Outline the molecular basis of genetic disorders
- \* Define a mutation and explain the different types of mutations and their effects
- \* Discuss the genetic basis of cancer
- \* Discuss the genetic assessment and diagnosis

## **12. Principles and applications of genetic engineering**

- \* Describe the principles of recombinant DNA technology
- \* Discuss the clinical applications of recombinant DNA technology

## **13. Principles and application of molecular biology in clinical practice**

- \* In prevention of diseases
- \* In diagnosis of diseases
- \* In treatment of diseases

## **Body Fluids; Medical Literature and Statistics (BS 1102)**

The aim of this module is to provide a sufficient knowledge and understanding of body fluids including blood and lymph and introduce students to medical literature and statistics.

### **Unit I:Body Fluids including Blood and Lymph**

The aim of this unit is to provide a sufficient knowledge and understanding on the following aspects of body fluids, blood and lymph:

- 1. Basis of body fluid compartmentalisation**
- 2. Composition and functions of body fluids**
- 3. Fluid balance**
- 4. Composition of blood**
- 5. Functions of blood**
- 6. Haemopoiesis and destruction of red blood cells**
- 7. Haemostasis and lysis of blood clots**
- 8. Blood groups and blood transfusion**
- 9. Physiological and biochemical bases of common haematological tests and their interpretation in disease**
- 10. Composition and functions of lymph**

## **Objectives**

### **1. Basis of body fluid compartmentalisation**

- \* Explain the body fluid compartments
- \* Explain volume distribution of water across body fluid compartments
- \* Outline the methods for the measurement of body fluids in different compartments

### **2. Composition and functions of body fluids**

- \* Explain the main electrolyte composition of body fluids - Na<sup>+</sup>, K<sup>+</sup>, Cl<sup>-</sup>, HCO<sup>3-</sup>
- \* Explain the non-electrolyte constituents of body fluids and their significance
- \* Define the terms osmolarity and osmolality
- \* Explain the plasma colloid osmotic pressure
- \* Describe the role of electrolytes in body fluids

### **3. Fluid balance**

- \* Explain the Starling's law for capillary exchange of fluids
- \* Explain the mechanisms of fluid balance
- \* Explain the principles of fluid replacement therapy

### **4. Composition of blood**

- \* Explain the composition of plasma
- \* Describe the cellular composition of blood
- \* Identify blood cells under the light microscope
- \* Draw and label the light microscopic appearance of blood cells
- \* Carry out red blood cell count and white blood cell count including differential count

- \* Describe haemoglobin concentration, haematocrit and erythrocyte sedimentation rate
- \* Explain haematological indices-
  - Mean Corpuscular Haemoglobin (MCH)
  - Mean Corpuscular Haemoglobin Concentration (MCHC)
  - Mean Corpuscular Volume (MCV)
  - Colour index

## 5. Functions of blood

- \* Outline the functions of blood cells -
  - gas transport
  - defence
- \* Outline the functions of plasma proteins -
  - colloid osmotic pressure
  - transport
  - protein reserve
  - viscosity
  - buffering action
  - defence

## 6. Haemopoiesis and destruction of red blood cells

- \* Explain the production of red blood cells
- \* Describe the structure and synthesis of haemoglobin
- \* Explain the destruction of red blood cells
- \* Explain the regulation of erythropoiesis
- \* Explain the production of white blood cells and platelets

## 7. Haemostasis and lysis of blood clots

- \* List the events in haemostasis



- \* Explain the physiological basis of -
  - bleeding time
  - clotting time
  - prothrombin time
  - ESR
  - osmotic fragility
  
- \* Measure -
  - clotting time
  - bleeding time
  - osmotic fragility
  - ESR
  - haematocrit
  - haemoglobin concentration
  
- \* Calculate haematological indices from haemoglobin concentration, RBC count and haematocrit

## **10. Composition and functions of lymph**

- \* Describe the composition of lymph
- \* Describe the functions of lymph -
  - transport
  - defence
  - fluid balance

## **Unit II:Medical Literature and Statistics**

The aim of this unit is to provide an introduction to Medical Literature and Statistics:

### **1 .Sources of scientific information and their use**

### **2.Basic concepts of medical statistics**

## **Objectives**

### **1. Sources of scientific information and their use**

- \* Describe the sources of scientific information
- \* Describe the use of the Index Medicus and Dental Index to find a reference-
  - author index
  - subject index
- \* Use Index Medicus and Dental Index to find given references
- \* Describe Medline search
- \* Write references using the Harward system and Vancouver system

### **2. Basic concepts of medical statistics:**

- \* Describe uses of statistics
- \* Describe sampling methods
- \* Define descriptive statistics
- \* Describe presentation of data -
  - frequency table
  - line graphs
  - bar charts
  - histogram
  - pie chart

- \* Describe normal distribution
- \* Describe the measures of central tendency - Mean  
Median  
Mode
- \* Describe the measures of dispersion-  
Range  
Variance  
Standard deviation (SD)  
Co-efficient of variation  
Standard Error of Mean (SEM)  
Confidence limits
- \* Define analytical statistics
- \* Describe null hypothesis
- \* Describe probability
- \* Describe testing of the null hypothesis ; Student's t test
- \* Describe correlation

# **Tissues of the Body (BS 1103)**

**The aim of this module is to impart a sufficient knowledge and understanding on the following aspects of the tissues of the body:**

- 1. Methods of study of tissues of the body**
- 2. Structure and functions of epithelia including glands**
- 3. Structure and functions of connective tissues**
- 4. Structure and functions of cartilage**
- 5. Structure and functions of bone**
- 6. Structure and functions of joints**
- 7. Structure and functions of muscles and nerves**

## **Objectives**

- 1. Methods of study of tissues of the body**
  - \* Compare and contrast the principles of light microscopy and electron microscopy
  - \* Use a light microscope
  - \* Explain the preparation of soft and hard tissues for light microscopy
  - \* Describe the procedure of staining with haematoxyline and eosin for routine histology
  - \* Distinguish between acidophilic and basophilic staining
  - \* List the common special stains and their uses in histology

## **2. Structure and functions of epithelia including glands**

- \* Give a definition for epithelium
- \* Give a classification for epithelia
- \* Describe the histological structure of each type of epithelium in relation to its function
- \* Identify the different types of epithelia under the light microscope
- \* Explain the nutrition of epithelia
- \* Give classifications for glands in relation to structure,function and secretion
- \* Describe the serous, mucous and mixed secretory glands

## **3. Structure and functions of connective tissues**

- \* Give a definition for connective tissues
- \* Give a classification for connective tissues
- \* Describe the histological structure of each type of connective tissue in relation to its function
- \* Identify the different types of connective tissues under the light microscope
- \* Describe the main chemical composition of connective tissues
- \* Describe the synthesis of collagen

## **4. Structure and functions of cartilage**

- \* Describe the composition of cartilage
- \* Identify the different types of cartilage and their structural components under the light microscope
- \* Draw and label the light microscopic appearance of cartilage
- \* Explain the formation and growth of cartilage
- \* Explain the nutrition of cartilage
- \* Describe the different types of cartilage in relation to their functions

## **5. Structure and functions of bone**

- \* Give classifications for bone
- \* Describe the composition of bone
- \* Describe the macroscopic and microscopic structure of bone
- \* Describe the endochondral and intra-membranous bone formation
- \* Describe bone remodelling
- \* Identify the structural components of bone under the light microscope
- \* Draw and label the light microscopic appearance of bone
- \* Describe the nutrition of bone
- \* Compare and contrast bone and cartilage

## **6. Structure and functions of joints**

- \* Give classifications for joints
- \* Describe the macroscopic structure of joints in relation to their function
- \* Draw and label the macroscopic appearance of joints
- \* 7. Structure and functions of muscle and nerve tissues
- \* Give a classification for muscles
- \* Describe the light microscopic and electron microscopic structure of the three types of muscle fibres - skeletal muscles, cardiac muscle and smooth muscle
- \* Identify the three types of muscles fibres under the light microscope
- \* Explain the organisation of skeletal muscles from gross to the molecular level with the aid of diagrams
- \* Describe the organisation of skeletal muscle in relation to function
- \* Draw and label the light microscopic appearance of neurones

- \* Describe the light microscopic appearance of neurones in relation to function
- \* Draw and label the light microscopic appearance of peripheral nerves
- \* Draw and label the light microscopic appearance of ganglions
- \* Identify neurones and peripheral nerve fibres under the light microscope
- \* Describe a motor unit
- \* Draw and label the light microscopic and electron microscopic structure of a neuromuscular junction
- \* Explain the propagation of nerve impulses
- \* Explain the transmission of an impulse across the neuro-muscular junction
- \* Explain the mechanisms of contraction of muscle fibres
- \* Describe the nerve-muscle preparation and its use in the study of muscle contraction and measurement of nerve conduction velocity
- \* Explain the isometric and isotonic contraction of muscle fibres
- \* Explain a muscle twitch, summation of contraction, tetany and muscle fatigue
- \* Explain the effect of temperature on muscle contraction

# General Developmental Biology (BS 1104)

The aim of this module is to provide a sufficient knowledge and understanding on the following aspects of human embryology:

1. Cleavage and implantation
2. Early embryogenesis and folding of embryo
3. Formation of foetal membranes and the placenta
4. Twinning
5. Congenital malformations
6. Development of the nervous system

## Objectives

1. **Cleavage and implantation**
  - \* Describe the development of morula
  - \* Describe the development of blastocyst
  - \* Describe implantation
  - \* Describe the changes in the wall of uterus
2. **Early embryogenesis and folding of embryo**
  - \* Describe the formation of the primitive streak and notocord
  - \* Describe the formation of the amniotic cavity and yolk sac
  - \* Describe the formation of the bilaminar disc
  - \* Describe the formation of the trilaminar disc

- \* Describe the folding of the embryo -
  - head fold
  - tail fold
  - lateral fold
  - formation of coelom

### **3. Formation of foetal membranes and the placenta**

- \* Describe the development of placenta
- \* Describe the placenta and foetal membranes
- \* Describe the placental circulation
- \* Describe the functions of placenta
- \* Describe the formation of amnion and umbilical cord

### **4. Twinning**

- \* Describe twinning - monozygotic twins  
dizygotic twins
- \* Explain the difference between monozygotic and dizygotic twins

### **5. Congenital malformations**

- \* Define the term congenital abnormality
- \* Discuss the causes of congenital malformations;
  - Environmental-
    - infectious agents
    - radiation
    - hormones
    - nutritional deficiencies
    - chemicals
    - chromosomal and genetic-
      - Down's syndrome

Klinefelter's syndrome  
Treacher Collins syndrome  
Turner's syndrome

**6. Development of the nervous system**

- \* Describe the formation of neural tube
- \* Describe the neural crest cells and their derivatives
- \* Explain the flexures of the primitive brain

## **Teeth and Supporting Structures(BS 1105)**

**The aim of this module is to provide a comprehensive knowledge and understanding on the following aspects of teeth and supporting structures:**

- 1. Tooth morphology of the permanent dentition**
- 2. Tooth morphology of the deciduous dentition**
- 3. Initial tooth development**
- 4. Amelogenesis**
- 5. Dentinogenesis**
- 6. Structure of tooth pulp**
- 7. Root formation and cementogenesis**
- 8. Development, structure and functions of periodontal ligament**
- 9. Development, structure and functions of alveolar bone**
- 10. Eruption and shedding of teeth**
- 11. Comparative dental anatomy**
- 12. Evolution of teeth and jaws**

## **Objectives**

### **1. Tooth morphology of the permanent dentition**

- \* Identify each tooth of the permanent dentition precisely
- \* Describe the crown and root morphology of mandibular and maxillary permanent teeth-
  - Incisors
  - Canines
  - Premolars
  - Molars
- \* Draw and label the morphology of each tooth of the permanent dentition
- \* Discuss the variations of tooth morphology

### **2. Tooth morphology of the deciduous dentition**

- \* Identify each tooth of the deciduous dentition precisely
- \* Describe the crown and root morphology of maxillary and mandibular deciduous teeth -
  - Incisors
  - Canines
  - Molars
- \* Draw and label the morphology of each tooth of the deciduous dentition

### **3. Initial tooth development**

- \* Describe the induction of tooth development
- \* Describe morphodifferentiation and histodifferentiation -
  - bud stage
  - cap stage
  - bell stage

- \* Identify different stages of tooth development under the light microscope
- \* Draw and label the different stages of tooth development

#### **4. Amelogenesis**

- \* Describe the differentiation of ameloblasts
- \* Describe the light microscopic and electron microscopic appearance of ameloblasts at different stages of amelogenesis
- \* Describe the formation and mineralisation of enamel matrix
- \* Describe the structure of enamel
- \* Describe the composition and properties of enamel
- \* Identify the features of enamel under the light microscope
- \* Discuss age changes of enamel

#### **5. Dentinogenesis**

- \* Describe the differentiation of odontoblasts
- \* Describe the light microscopic and electron microscopic appearance of odontoblasts
- \* Describe the formation and mineralisation of dentine
- \* Describe the secondary dentine formation
- \* Describe the structure of dentine
- \* Describe the composition and properties of dentine
- \* Identify the features of dentine under the light microscope
- \* Describe the dentinal innervation and sensation
- \* Discuss the age changes of dentine

#### **6. Structure of tooth pulp**

- \* Describe the morphology of tooth pulp
- \* Describe the development of tooth pulp

- \* Describe the histology of tooth pulp
- \* Describe the pulpal innervation and sensation
- \* Identify the components of tooth pulp under the light microscope
- \* Discuss the age changes of tooth pulp

## **7. Root formation and cementogenesis**

- \* Describe the initiation of root formation
- \* Describe the differentiation of odontoblasts and dentinogenesis
- \* Describe the differentiation of cementoblasts
- \* Describe the formation and mineralisation of cementum
- \* Describe the light microscopic and electron microscopic appearance of cementoblasts and cementocytes
- \* Describe the structure of cementum
- \* Describe the composition and properties of cementum
- \* Identify the features of cementum under the light microscope
- \* Discuss the age changes of cementum

## **8. Development, structure and functions of periodontal ligament**

- \* Describe the development of periodontal ligament
- \* Describe structure of periodontal ligament
- \* Describe the blood supply to periodontal ligament
- \* Describe the nerve supply to periodontal ligament
- \* Describe the functions of periodontal ligament
- \* Discuss the age changes of periodontal ligament

## **9. Development, structure and functions of alveolar bone**

- \* Describe the development of alveolar bone
- \* Describe the structure of alveolar bone
- \* Describe the blood supply to alveolar bone

- \* Describe the nerve supply to alveolar bone
- \* Describe the functions of alveolar bone
- \* Discuss the age changes of alveolar bone

### **10. Eruption and shedding of teeth**

- \* Discuss the hypotheses of tooth eruption
- \* Discuss the chronology of tooth development –
  - initiation of calcification
  - crown completion / root formation
  - eruption
  - root completion
- \* Describe the mechanism of shedding of deciduous teeth

### **11. Comparative dental anatomy**

- \* Discuss the classification of Vertebrates and Vertebrate dentition
- \* Discuss the evolution of the jaws and the Temporomandibular joint
- \* Discuss the comparative anatomy of the dental tissues

### **12. Evolution of teeth and jaws**

- \* Describe the dentitions of fossils of importance in dentistry; the antiquity of man.
- \* Describe the changes in the dentition during human evolution
- \* Describe the evolution of the human face
- \* Describe the teeth and jaws as evidence of evolution

## **Cardiovascular System (BS 1106)**

**The aim of this module is to provide a sufficient knowledge and understanding on the following aspects of the cardiovascular system:**

- 1. Development of the cardiovascular system**
- 2. Functional anatomy of the cardiovascular system**
- 3. Pumping action of the heart in terms of cardiac muscle physiology, electrical activity, cardiac cycle and regulation**
- 4. Normal functioning of the arteries, arterioles, capillaries, venules and veins with reference to maintenance of blood pressure and blood flow**
- 5. Effect of common diseases/abnormalities of the cardiovascular system on cardiovascular function**
- 6. Physiological basis of common tests of cardiovascular function and interpretation of their results in cardiovascular disorders**
- 7. Examination of the cardiovascular system**

## **Objectives**

### **1. Development of the cardiovascular system**

- \* Describe the development of the circulatory system and its common congenital abnormalities
  - development of the heart
  - development of the aortic arches
  - foetal circulation
  - atrialseptal defect
  - ventricularseptal defect
  - Fallot's tetralogy
  - dextrocardia
  - patent ductus arteriosus

### **2. Functional anatomy of the cardiovascular system**

- \* Outline the overall organisation of the cardiovascular system in the body
- \* Describe the external and internal morphology of the heart
- \* Describe the blood supply to the heart
- \* Describe the microscopic structure of the wall of the heart and heart valves
- \* Identify the pericardium, epicardium, myocardium and endocardium including heart valves in tissue sections under the light microscope
- \* Draw and label the light microscopic appearance of arteries, arterioles, capillaries, sinusoids, venules and veins
- \* Identify arteries, arterioles, capillaries, sinusoids, venules and veins under the light microscope
- \* Draw and label a diagram of the terminal vascular bed

**3. Pumping action of the heart in terms of cardiac muscle physiology, electrical activity, cardiac cycle and regulation**

- \* Explain the origin and spread of cardiac excitation
- \* Explain the cardiac cycle, venous return and cardiac out put
- \* Explain the intrinsic and extrinsic mechanisms for the regulation of heart pumping

**4. Normal functioning of the arteries, arterioles, capillaries, venules and veins with reference to maintenance of blood pressure and blood flow**

- \* Explain blood pressure and factors affecting it
- \* Explain the regulation of blood pressure
- \* Explain blood flow through arteries, arterioles, capillaries, venules and veins and the pressure changes during circulation

**5. Effect of common diseases/abnormalities of the cardiovascular system on Cardiovascular function**

- \* Explain the effects of hypertension, myocardial infarction, heart failure, circulatory shock, septal defects and patent ductus arteriosus on cardiovascular function

**6. Physiological basis of tests of cardiovascular function and interpretation of their results in cardiovascular disorders**

- \* Explain the principles and methods of electrocardiography
- \* Describe the normal ECG wave pattern in relation to the electrical activity of the heart
- \* Calculate the heart rate and PR interval using ECG and comment on the results

- \* Explain the physiological basis of blood pressure measurement using mercury sphygmomanometer
- \* Measure the blood pressure using a mercury sphygmomanometer

## **7. Examination of the cardiovascular system**

- \* Explain the physiological basis of -
  - cyanosis
  - anaemia
  - radial pulse
  - jugular venous pressure
  - heart sounds
- \* Do a physical examination and comment on
  - presence/ absence of cyanosis
  - presence/ absence of anaemia
  - radial pulse
  - presence/ absence of peripheral pulses
  - heart sounds

## **Respiratory System (BS 1107)**

The aim of this module is to provide a sufficient knowledge and understanding on the following aspects of the respiratory system:

1. Development of the respiratory system
2. Functional anatomy of the respiratory system
3. Mechanics of respiration
4. Pulmonary ventilation
5. Gas exchange
6. Gas transport between lungs and tissues
7. Regulation of respiration
8. Common abnormalities of respiratory function
9. Physiological basis of common tests of pulmonary function and their interpretation in pulmonary disorders
10. Clinical examination of the respiratory system
11. Cardiopulmonary resuscitation

### **Objectives**

1. Development of the respiratory system
  - \* Describe the development of the respiratory system and its common malformations-

trachea  
bronchi  
lungs  
visceral pleura  
parietal pleura  
tracheo -oesophageal fistula

- \* Describe the development of the diaphragm

## **2. Functional anatomy of the respiratory system**

- \* Describe the skeletal arrangement of the thorax in relation to breathing
- \* Discuss the arrangement of muscles that cause lung expansion and contraction
- \* Explain the gross anatomy of the organs of the respiratory system in relation to respiratory functions.
- \* Explain the microscopic structure of nasal, pharyngeal and laryngeal mucosa, trachea, bronchi, bronchioles and alveoli in relation to respiratory function
- \* Draw and label the light microscopic appearance of nasal, pharyngeal and laryngeal mucosa, trachea, bronchi, bronchioles and alveoli
- \* Identify the structural features of nasal, pharyngeal and laryngeal mucosa, trachea, bronchi, bronchioles and alveoli under the light microscope
- \* Draw and label the ultrastructure of the respiratory membrane.
- \* Explain the blood supply to the lungs
- \* Explain the effects of alveolar oxygen, hydrostatic pressure and increased cardiac output on blood flow through the lungs

### **3. Mechanics of respiration**

- \* Explain the movement of air into and out of lungs in relation to volume and pressure changes in the thoracic cavity
- \* Explain the compliance of the thorax and lungs

### **4. Pulmonary ventilation**

- \* Explain lung volumes and capacities
- \* Define the pulmonary ventilation and alveolar ventilation
- \* Explain the concept of pulmonary ventilation to perfusion ratio

### **5. Gas exchange**

- \* List the partial pressures of oxygen and carbondioxide in atmospheric air, alveolar air and lung capillaries
- \* Explain the diffusion of gases across the respiratory membrane

### **6. Gas transport between lungs and tissues**

- \* Explain the mechanisms of oxygen transport in blood
- \* Explain the oxygen-haemoglobin dissociation curve
- \* Explain the factors that affect oxygen transport -
  - pH
  - temperature
  - 2, 3, DPG
  - CO<sub>2</sub> (Bohr effect)
  - Carbon monoxide
- \* Explain the mechanisms of CO<sub>2</sub> transport in blood -
  - role of carbonic anhydrase
  - buffering action of haemoglobin
  - chloride shift

- \* Explain the carbondioxide -haemoglobin dissociation curve
- \* Explain the factors that affect CO<sub>2</sub> transport - pH
  - temperature
  - 2, 3, DPG
  - CO<sub>2</sub> (Haldane effect)
  - CO

## **7. Regulation of respiration**

- \* Describe the respiratory centre
- \* Explain the neural regulation of respiration -
  - normal rhythm
  - effect of higher centres
  - effect of lung reflexes
- \* Describe the distribution of chemoreceptors and their function
  - Explain the chemical regulation of respiration-
  - effect of hypoxia
  - effect of hypercapnia
  - effect of pH

## **8. Common abnormalities of respiratory function**

- \* Explain the effects of common lung disorders on respiratory functions -
  - asthma
  - emphysema
  - pneumonia
  - fibrosis

## **9. Physiological basis of common tests of pulmonary function and their interpretation in pulmonary disorders**

- \* Explain the use of the spirometer in recording lung volumes and capacities
- \* Interpret a spirometer recording
- \* Define forced expiratory volume in the first second (FEV1)
- \* Measure FEV1 using a spirometer tracing and interpret the results
- \* Measure the respiratory flow using a peak flow meter and comment on the results

## **10. Clinical examination of the respiratory system**

- \* Do a physical examination by inspection, palpation, percussion and auscultation and comment on -
  - respiratory rate
  - chest movements
  - percussion note
  - breath sounds
- \* Explain the pathophysiological basis of -
  - cyanosis
  - anaemia
  - dyspnoea
  - tachypnoea

## **11. Cardio-pulmonary resuscitation (CPR)**

- \* Explain the principles of CPR
- \* Explain the indications for CPR
- \* Show the method of assessment to determine the need for CPR
- \* Perform CPR effectively using a mannequin

# **Gastrointestinal System (BS 1108)**

The aim of this module is to provide a sufficient knowledge and understanding on the following aspects of the gastrointestinal system:

- 1. Development of the gastrointestinal system**
- 2. Functional anatomy of the gastrointestinal system**
- 3. Motility of the gastrointestinal tract with reference to mixing and transport of food**
- 4. Secretory functions of the gastrointestinal system and their regulation**
- 5. Digestion and absorption of food in the gastrointestinal tract**
- 6. Common disorders of gastrointestinal function**

## **Objectives**

- 1. Development of the gastrointestinal system**
  - \* Describe the development of the gut-
    - fore gut
    - mid gut
    - hind gut
- 2. Functional anatomy of the gastrointestinal system**
  - \* Describe the positional arrangement of different parts/ organs of the gastrointestinal system to each other and to external land marks

- \* Describe the morphology of different parts/ organs of the gastrointestinal system in relation to function
- \* Outline the blood supply to the gastrointestinal system in relation to function
- \* Draw and label the basic structure of the wall of the gastrointestinal tract and explain the variations in different segments in relation to function -

oesophagus

stomach

small intestine

large intestine

- \* Identify the structural features of the oesophagus under the light microscope
- \* Describe the basic histology of the salivary glands and exocrine pancreas
- \* Describe the histology of the liver in relation to function
- \* Identify the structural features of the liver under the light microscope
- \* Draw and label the light microscopic appearance of the liver

### **3. Motility of the gastrointestinal tract with reference to mixing and transport of food**

- \* Describe the passage of food through the oesophagus
- \* Describe the storage, mixing and propulsion of food in the stomach
- \* Describe gastric emptying and its regulation
- \* Describe the movements of the small intestine
- \* Describe the movements of the large intestine
- \* Describe defaecation

#### **4. Secretory functions of the gastrointestinal system**

- \* Outline the secretion of saliva
- \* Explain the characteristics and constituents of saliva relevant to digestive functions
- \* Explain the mechanisms of gastric secretion
- \* Explain the characteristics and constituents of gastric secretions
- \* Explain the regulation of gastric secretion
- \* Explain the mechanism of pancreatic secretion
- \* Explain the characteristics and constituents of pancreatic secretions
- \* Explain the regulation of pancreatic secretion
- \* Explain the mechanism of bile secretion
- \* Explain the characteristics and constituents of bile
- \* Explain the metabolism of bile acids and bile pigments
- \* Explain the regulation of bile secretion
- \* Discuss the mechanisms of development of jaundice and its implications
- \* Explain the mechanisms of small intestinal secretion and large intestinal secretion
- \* Explain the characteristics and constituents of secretions in the small intestine
- \* Explain the regulation of small intestinal secretion
- \* Explain the availability of digestive enzymes in the small intestine

#### **5. Digestion and absorption of food in the gastrointestinal tract**

- \* Explain the digestion of carbohydrates in the gastrointestinal tract
- \* Explain the digestion of proteins in the gastrointestinal tract
- \* Explain the digestion of fats in the gastrointestinal tract

- \* Explain the absorption of nutrients in the -
  - mouth
  - tomach
  - small intestine
  - large intestine

## **6. Common disorders of gastrointestinal function**

- \* Explain the effects of-
  - gastrectomy
  - disorders of bile secretion
  - disorders of pancreatic secretion
  - diarrhoeal diseases
  - changes in the gut flora

## **Thorax and abdomen (BS 1109)**

The aim of this module is to provide a sufficient knowledge and understanding of the gross structures of the thoracic and abdominal region of the human body. Following aspects are considered here.

- 1. Terminology**
- 2. Osteology**
- 3. Structure of the anterior body wall including the mammary gland**
- 4. Thoracic cavity and its contents**
- 5. Pleura and lungs**
- 6. Heart and pericardium**
- 7. Mediastinum**
- 8. Blood vessels, nerves, lymphatics and other viscera in the thoracic region**
- 9. Diaphragm**
- 10. Abdomen**

### **Objectives**

- 1. Terminology**
  - \* Explain the terms anatomical position, supine position and prone position.

- \* Explain the terms  
anterior/posterior/superior/inferior/medial/lateral
- \* Explain the terms  
Ventral/dorsal/cranial/caudal/medial/lateral/proximal/distal  
internal/external/superficial/deep/ipsilateral/contralateral/Unilateral
- \* Explain the terms used to describe the anatomical planes  
sagittal/coronal/transverse/median planes  
transverse and longitudinal sections
- \* Explain the terms used to describe the movements of joints  
flexion/extension/abduction/adduction/protraction/retraction

## 2. Osteology

### **The student should be able to identify/describe;**

- \* The bones forming the thoracic cage and their parts.
- \* The bones/structures forming the thoracic inlet and outlet
- \* Parts of a typical thoracic vertebra
- \* Atypical vertebrae and their functions
- \* Parts of a typical rib
- \* Atypical ribs and their functions
- \* The structures attached/related to the 1st rib
- \* Parts of the sternum
- \* The muscles attached to the sternum, a typical rib and a typical vertebra
- \* The vertebral levels of the following  
Jugular notch  
Sternal angle

## Xiphoid process

- \* The manubriosternal, sternocostal, costochondral, costovertebral and xiphisternal joints.

### **3. Structure of the anterior body wall including the mammary gland**

- \* Should know on the living body;
  1. The palpable landmarks
    - Suprasternal notch
    - Manubrio-sternal junction (sternal angle)
    - Xiphoid process
    - Costal margin
    - Pubic tubercle
    - Mid-inguinal point
    - Anterior superior iliac spine
  2. The position of the pelvis in the erect posture.
  3. The transpyloric and transtubercular planes
  4. Abdominal regions/quadrants
  5. Outline the recti muscles and the tendinous intersections
- \* Describe/identify the cutaneous nerves, superficial arteries and veins of the anterior body wall
- \* Describe the structure of the mammary gland
- \* Describe the attachments, nerve supply and actions of the following muscles
  - Pectoralis major
  - Pectoralis minor
  - Serratus anterior
  - Latissimusdorsi
- \* Describe/identify the contents of an intercostal space; muscles, nerves, arteries and veins.

- \* Describe the distribution of a typical thoracic spinal nerve
- \* Describe the arrangement of muscles in the anterior abdominal wall
  - External oblique
  - Internal oblique
  - Transversus abdominis
  - Rectus abdominis
- \* Describe the formation and contents of the Rectus sheath
- \* Describe the internal thoracic artery; origin, course and distribution.
- \* State/describe with regards to the anterior thoracic and abdominal walls;
  1. The venous drainage
  2. The lymphatic drainage
  3. The dermatomes
  4. Functions of intercostal and abdominal muscles
  5. The position selected in relation to ribs for the passage of a needle through the intercostal spaces (giving seasons).

#### **4. Thoracic cavity and its contents**

- \* Describe the boundaries of the thoracic inlet and outlet
- \* Describe the divisions of the thoracic cavity
- \* Describe the pleural cavity and the divisions of the mediastinum.
- \* Describe the contents of the compartments of the mediastinum
- \* Draw and label the arrangement of structures in the different parts of the mediastinum

#### **5. Pleura and lungs**

- \* Describe the surface markings/projections of the pleura and lungs including the lobes, apex, lung fissures and the cardiac notch.

- \* Identify/describe the pleura, pleural reflections and recesses.
- \* Describe the arrangement of pleura, Visceral pleura
- \* Parietal pleura and its subdivisions
- \* Describe the blood supply of the pleura
- \* Describe the significance of innervations of the pleura.
- \* Explain the following clinical conditions;
  - Pneumothorax
  - Haemothorax
  - Pleural effusion
  - Empyema
  - Pleuracy
- \* Be able to orientate the right and left lungs,
- \* Describe the surfaces, borders, fissures and lobes of right and left lungs
- \* Describe the contact impressions seen on the lung surfaces
- \* Describe/ draw and label the arrangement of structures at the roots of right and left lungs
- \* Compare and contrast the right and left lungs
- \* Define the term bronchopulmonary segments.
- \* Describe the arrangement of bronchopulmonary segments in right and left lungs and explain the importance of them in surgery
- \* Describe the blood supply, nerve supply and lymphatic drainage of the lungs

Note; Also look under *Respiratory system BS 1107*

## **6. Heart and pericardium**

- \* Describe the arrangement of the pericardium
  - Fibrous pericardium
  - Serous pericardium (parietal and visceral)

- \* Describe the location and formation of pericardial sinuses (oblique and transverse)
- \* Describe the nerve supply and blood supply of the pericardium
- \* Describe the surface marking of the heart
- \* Describe/indicate the surfaces and borders of the heart
- \* Identify/explain the chambers facing the surfaces and borders
- \* List the chambers of the heart and describe the blood flow through them
- \* Describe the origin, course and distribution of the right and left coronary arteries
- \* Describe the venous drainage of the heart
- \* Describe the internal features of the chambers of the heart
  1. The thickness of the walls and the appearance of the internal surfaces
  2. Interatrial and interventricular septa (position, appearance, and thickness)
  3. Orifices – atrio ventricular and for the great vessels
- \* Describe the heart valves
- \* Location
- \* Actions
- \* Surface marking/Auscultation areas
- \* Describe the conduction system of the heart
- \* Describe the fibrous skeleton of the heart

Note: Also look under *Cardiovascular system, BS 1106*

## **7. Mediastinum**

- \* Describe the boundaries of upper aperture (thoracic inlet) and lower aperture of the thorax

- \* Draw and label a diagram of the thoracic inlet to show the structures passing from neck to thorax
- \* Describe the boundaries of the mediastinum and its subdivisions
- \* Describe the contents of the subdivisions of the mediastinum
- \* Draw and label the arrangement of structures in different parts of the mediastinum

## **8. Blood vessels, nerves, lymphatics and the viscera in the thoracic region**

- \* Describe the position and relations of the trachea and extrapulmonary bronchi
- \* Describe the position, course and relations of the oesophagus
- \* Describe the blood supply and the nerve supply of the oesophagus
- \* Understand the clinical importance of the venous drainage of the lower 1/3rd of the oesophagus
- \* Describe the sites of constrictions in the oesophagus
- \* Describe the position, relations and the blood supply of the thymus
- \* Describe the major branches of the arch of aorta
- \* Describe the formation of the superior vena cava
- \* Draw and label a diagram of the root of the neck showing the veins that make the superior vena cava and the main branches of the arch of aorta
- \* Describe the course of the right and left phrenic nerves
- \* Describe the course of the vagus nerve in the thorax
- \* Describe the formation and distribution of cardiac plexuses (superficial and deep), pulmonary plexus and oesophageal plexus of nerves
- \* Describe the course of right and left Recurrent laryngeal nerves

- \* Describe the arrangement of pulmonary arteries and veins
- \* State the location and embryological origin of the Ligamentum arteriosum
- \* Describe the origin, course and site of termination of the thoracic duct
- \* Describes the areas drained by the thoracic duct and the right lymphatic trunk
- \* Define the extensions and describe the course and distribution of branches of the descending aorta
- \* Describe the tributaries of the inferior vena cava
- \* Describe the components and distribution of thoracic sympathetic trunk

## **9. Diaphragm**

- \* Describe the main parts of the diaphragm
- \* Describe the muscle arrangement in the diaphragm
- \* Describe the nerve supply of the diaphragm
- \* Describe the openings in the diaphragm and structures passing through them

## **10. Abdomen**

- \* Describe the abdominal quadrants and the organs in relation to each quadrant
- \* Describe the general disposition of the peritoneum (peritoneal reflectins)
- \* Describe/list the folds derived from the dorsal and ventral mesentery
- \* List the divisions of the stomach
- \* List the parts of the small intestine
- \* List the parts of the duodenum

- \* Describe the blood supply to the duodenum
- \* Describe the macroscopic differences between the jejunum and the ileum
- \* Describe the macroscopic differences between the small and large intestines
- \* Describe the blood supply of the small and the large intestines
- \* List the different lobes of the liver
- \* List the structures related to different surfaces of the liver
- \* Describe the blood supply of the liver
- \* Describe the position, function and the blood supply of the gall bladder
- \* Describe the biliary system
- \* Describe the position, relations and the blood supply of the pancreas
- \* Describe the position, relations and the blood supply of the spleen
- \* Describe the position, relations and the blood supply of the kidneys
- \* Describe the extent, relations and branches of the abdominal aorta
- \* Describe the formation and the relations of the inferior vena cava
- \* Describe the formation of the portal vein
- \* Describe the musculoskeletal framework of the posterior abdominal wall

## Recommended Text Books (1<sup>st</sup> Semester)

### Anatomy

1. Clinical Neuro Anatomy by Richard S. Snell.
2. Clinical Oriented Anatomy by K. L. Moore
3. Grant's Atlas of Anatomy by A.M. R. Agur and A. F. Dalley.
4. Grey's Anatomy, The Anatomical Basis of Clinical Practice edited by S. Standing.
5. Illustrated Anatomy of the Head and Neck by M.J. Fehrenbach and S.W. Herring.
6. Langman's Medical Embryology by T.W. Sadler
7. Last's Anatomy. Regional and Applied edited by C.S. Sinnathambi
8. McMinn's Clinical Atlas of Human Anatomy by T.H. Abrahams.
9. Wheater's Functional Histology. A Text and Color Atlas by B. Young

### Dental Anatomy

1. Oral Anatomy, Histology and Embryology by B.K.B. Berkovitz et.al.
2. Ten Cate's Oral Histology, Development, Structure, and Function by A. Nanci
3. Wheeler's Dental Anatomy, Physiology, and Occlusion by M.M. Ash and S.J. Nelson

### Physiology

1. Essentials of Oral physiology by R.M. Bradley
2. Review of Medical Physiology by W.F. Ganong
3. Textbook of Medical Physiology by A.C. Guyton and J.E. Hall

### Biochemistry

1. Biochemistry (Lippincott's Illustrated Reviews Series) by Pamela C. Champe, Richard A Harvey
2. Food and Nutrition by T. W. Wickremanayaka
3. Harper's Illustrated Biochemistry by Murray et.al.
4. Lecture notes in Medical Genetics by J. Bradley, D. Johnson, B. Pober.
5. Text Book of Biochemistry for Dental Students by D. M Vasudevan, Srikumari S

# 2<sup>nd</sup> Semester

## **Food and Nutrition (BS 1201 )**

The aim of this module is to provide a sufficient knowledge and understanding on the following aspects of human nutrition:

- 1. Macronutrient requirements and the effects of their deficiency and excess intake on physiological functions**
- 2. Micronutrient requirements and the effects of their deficiency/ toxicity on physiological functions**
- 3. Nutritional characteristics of cereals**
- 4. Nutritional characteristics of pulses**
- 5. Nutritional characteristics of vegetables and fruits**
- 6. Nutritional characteristics of milk and foods of animal origin**
- 7. Relation between overall nutrition and health**

### **Objectives**

- 1. Macronutrient requirements and the effects of their deficiency and excess intake on physiological functions**
  - \* Calculation of the energy requirements of children and adults in different physiological conditions
  - \* Calculate the protein requirements of children and adults
  - \* Discuss the effects of protein –energy malnutrition on man

- \* Discuss the effects of excessive intake of energy
- \* Describe nitrogen balance
- \* Discuss the importance of essential amino acids and good quality proteins to maintain health

## **2. Micronutrient requirements and the effects of their deficiency/ toxicity on physiological functions**

- \* Discuss vitamin A, D, E, K in relation to-  
absorption/  
synthesis  
storage  
functions  
daily requirements  
deficiencies and toxicity  
sources
- \* Discuss B vitamins and vitamin C in relation to -  
absorption  
storage  
functions  
daily requirements  
deficiencies  
sources
- \* Explain Iron, Calcium, Phosphorus and Iodine metabolism -  
absorption  
storage, transport and distribution  
functions  
losses/ excretions  
daily requirements  
deficiency and toxicity

- \* Explain Fluoride metabolism -
  - functions
  - sources
  - toxicity
- \* Explain Copper, Zinc and Magnesium metabolism -
  - biochemical role
  - sources
  - daily requirements
  - deficiency and toxicity

### **3. Nutritional characteristics of cereals**

- \* Discuss the nutritional characteristics of rice, wheat, kurakkan and maize -
  - nutritive value
  - effects of processing and storage
  - effects of preparation

### **4. Nutritional characteristics of pulses**

- \* Discuss the nutritional characteristics of soya bean, green gram, dhal, horse
  - gram, cowpea, ground nuts -
  - nutritive value
  - effects of processing and storage
  - effects of preparation

### **5. Nutritional characteristics of vegetables and fruits**

- \* Discuss the nutritional characteristics of leafy vegetables, fruit vegetables, root vegetables, pumpkin and gourds, spices, condiments and souring agents-

nutritive value  
effects of food preparation

- \* Discuss the nutritional characteristics of fruits -  
nutritive value  
effects of processing and storage

## **6. Nutritional characteristics of milk and foods of animal origin**

- \* Describe the composition of human milk
- \* Compare and contrast human milk with cow-milk, goat milk and buffalo milk
- \* Describe processing and storage of milk and their effects on nutritive value-

Pasteurisation

Sterilisation

Powdered milk

Condensed milk

- \* Describe the nutritional characteristics of milk products -  
cheese  
curd  
butter  
ghee
- \* Describe the nutritional characteristics of meat, fish and eggs -  
nutritive value  
processing and storage

## **7. Relation between overall nutrition and health**

- \* Discuss the principles involved in formulating a balanced diet
- \* Discuss the effects of diet on teeth and other oral tissues

## **Endocrinology (BS 1202)**

**The aim of this module is to provide a sufficient knowledge and understanding on the following aspects of Endocrinology and Metabolism:**

- 1. Temperature regulation in the body**
- 2. Functional anatomy of the endocrine system**
- 3. Principles of hormone secretion and action**
- 4. Secretion, regulation of secretion and functions of the anterior pituitary hormones**
- 5. Secretion, regulation of secretion and functions of the posterior pituitary hormones**
- 6. Secretion, regulation of secretion and functions of the thyroid hormones**
- 7. Secretion, regulation of secretion and functions of the adrenocortical hormones**
- 8. Secretion, regulation of secretion and functions of the pancreatic hormones**
- 9. Common disorders of hormone secretion**

## **Objectives**

### **1. Temperature regulation in the body**

- \* Describe the methods of measuring body temperature -  
Measure oral and axillary temperature
- \* Explain the regulation of normal body temperature -  
temperature regulatory centre  
concept of "set point"  
mechanisms of heat gain and heat loss
- \* Describe abnormalities of temperature regulation -  
fever  
hypothermia

### **2. Functional anatomy of the endocrine system**

- \* Describe the location of endocrine glands in the body -  
hypothalamus  
pituitary  
thyroid  
parathyroid  
adrenal glands  
endocrine pancreas  
ovaries  
testes  
placenta
- \* Describe the morphology and histology of -  
pituitary gland  
thyroid gland  
parathyroid gland  
adrenal gland

endocrine pancreas

- \* Draw and label the light microscopic appearance of -
  - pituitary gland
  - thyroid gland
  - parathyroid gland
  - adrenal gland
  - endocrine pancreas
- \* Identify the structural features of endocrine glands under the light microscope-
  - pituitary gland
  - thyroid gland
  - parathyroid gland
  - adrenal gland
  - endocrine pancreas

### **3. Principles of hormone secretion and action**

- \* List the three types of hormones-steroid hormones
  - derivatives of tyrosine
  - protein/ peptide hormones
- \* Outline the basic chemical structure of different types of hormones
- \* Explain the principles of synthesis of different types of hormones
- \* Explain the principles of storage and secretion of different types of hormones
- \* Describe the principles of hormone transport in blood
- \* Explain the mode of action of different types of hormones -
  - cell membrane receptors
  - cytoplasmic receptors
  - nuclear receptors
  - second messenger system

**4. Secretion, regulation of secretion and functions of the anterior pituitary hormones**

- \* List the anterior pituitary hormones
- \* Explain the secretion and regulation of secretion of anterior pituitary hormones
- \* Explain the functions of anterior pituitary hormones

**5. Secretion, regulation of secretion and functions of the posterior pituitary hormones**

- \* List the posterior pituitary hormones
- \* Explain the secretion and regulation of secretion of posterior pituitary hormones
- \* Explain the functions of posterior pituitary hormones

**6. Secretion, regulation of secretion and functions of the thyroid hormones**

- \* List the thyroid hormones
- \* Explain the synthesis of thyroxin and tri-iodothyronine
- \* Explain the secretion and regulation of secretion of thyroid hormones
- \* Explain the functions of thyroid hormones

**7. Secretion, regulation of secretion and functions of the adrenocortical hormones**

- \* List the adrenocortical hormones
- \* Explain the regulation of secretion of adrenocortical hormones
- \* Explain the functions of adrenocortical hormones

## **8. Secretion, regulation of secretion and functions of the pancreatic hormones**

- \* List the pancreatic hormones
- \* Explain the regulation of secretion of pancreatic hormones
- \* Explain the functions of pancreatic hormones

## **9. Common disorders of hormone secretion**

- \* Explain the disorders in the secretion of - pituitary hormones  
thyroid hormones  
adrenocortical hormones  
pancreatic hormones
- \* Identify clinical features of the disorders in secretion of -  
pituitary hormones  
thyroid hormones  
adrenocortical hormones  
pancreatic hormones

# **Oral Biology (BS 1203)**

**The aim of this module is to provide a comprehensive knowledge and understanding on the structure and functions of the oral cavity and perioral structures:**

## **Unit I: Oral Anatomy**

**The aim of this unit is to provide a comprehensive knowledge and understanding on the following aspects of oral anatomy:**

- 1. Functional anatomy of the skin**
- 2. Pharyngeal arches, development of the face and associated malformations**
- 3. Development of the oral cavity and structures arising from the oral cavity and their abnormalities**
- 4. Functional anatomy of the oral mucosa**
- 5. Functional anatomy of the gingival**
- 6. Functional anatomy of the lips**
- 7. Functional anatomy of the cheeks**
- 8. Functional anatomy of the tongue**
- 9. Functional anatomy of the floor of the mouth**
- 10. Functional anatomy of the palate**
- 11. Functional anatomy of the pharynx**

## **Objectives**

### **1. Functional anatomy of the skin**

- \* Describe the cell renewal
- \* Describe the structure of the skin in relation to function
- \* Describe the regional variations of the skin-
  - thin skin
  - thick skin
- \* Identify the histological features of the skin under the light microscope
- \* Draw and label the light microscopic appearance of the skin
- \* Outline the functions of the skin

### **2. Pharyngeal arches, development of the face, and associated malformations**

- \* Describe the pharyngeal arches
- \* Describe the fate of the pharyngeal arches
- \* Describe the development of the face
- \* Describe the prenatal and postnatal development of the mandible and maxilla
- \* Describe the development of the temporomandibular joint
- \* Describe the development of the eye
- \* Describe the development of the ear
- \* Explain the following congenital abnormalities-
  - unilateral and bilateral cleft lip/ palate

### **3. Development of the oral cavity and structures arising from the oral cavity and their abnormalities**

- \* Describe the development of the tongue
- \* Describe the development of thyroid gland
- \* Describe the development of salivary glands -
  - submandibular
  - sublingual
  - parotid
- \* Describe the development of anterior pituitary
- \* Explain the following congenital abnormalities ectopic thyroid gland
  - Thyroglossal cyst
  - Ankyloglossia
  - bifid tongue

### **4. Functional anatomy of the oral mucosa**

- \* Classify oral mucosa in relation to function -
  - masticatory mucosa
  - lining mucosa
  - specialised mucosa
- \* Describe the structure of the oral mucous membrane in relation to function
- \* Describe the regional variations in the structure of the oral mucous membrane
- \* Identify the features of cross sections of the three types of oral mucosa under the light microscope
- \* Draw and label the light microscopic appearance of the three types of oral mucosa
- \* Describe the functions of the oral mucosa

- \* Describe the age changes of the oral mucosa

## **5. Functional anatomy of the gingiva**

- \* Describe the structure of the gingiva
- \* Describe the dento-gingival junction-  
formation  
light microscopic appearance  
ultrastructure
- \* Describe the blood supply to the gingiva
- \* Describe the nerve supply to the gingiva
- \* Identify the features in a cross section of the gingiva under the light microscope
- \* Draw and label the light microscopic appearance of the gingiva
- \* Describe the functions of the gingiva
- \* Describe the age changes of gingiva

## **6. Functional anatomy of the lips**

- \* Describe the structure of the lip
- \* Describe the arrangement of orbicularis oris
- \* Describe the mucocutaneous junction
- \* Identify the features of a sagittal section of the lip under the light microscope
- \* Draw and label the light microscopic appearance of a sagittal section of the lip
- \* Describe the blood supply to the lip
- \* Describe the nerve supply to the lip
- \* Describe the labial vestibule

## **7. Functional anatomy of the cheek**

- \* Describe the structure of the cheek
- \* Describe the buccinator muscle
- \* Describe the blood supply to the cheek
- \* Describe the nerve supply to the cheek

## **8. Functional anatomy of the tongue**

- \* Describe the structure of the tongue –
  - anterior 2/3
  - posterior 1/3
- \* Describe the arrangement of the muscles of the tongue -
  - Intrinsic muscles
    - Vertical
    - Transverse
    - Longitudinal
  - Extrinsic muscles
    - genioglossus
    - hyoglossus
    - palatoglossus
    - styloglossus
- \* Identify the features in a cross section of the tongue under the light microscope-
  - anterior 2/3
  - posterior 1/3
- \* Draw and label the light microscopic appearance of the tongue -
  - anterior 2/3
  - posterior 1/3

- \* Describe the functions of the tongue muscles
- \* Describe the blood supply to the tongue
- \* Describe the nerve supply to the tongue

### **9. Functional anatomy of the floor of the mouth**

- \* Describe the structure of the floor of the mouth
- \* Describe the arrangement of muscles in the floor of the mouth
- \* Describe the blood supply to the floor of the mouth
- \* Describe the nerve supply to the floor of the mouth

### **10. Functional anatomy of the palate**

- \* Describe the structure of the hard palate
- \* Describe the structure of the soft palate
- \* Describe the blood supply to the palate
- \* Describe the nerve supply to the palate
- \* Describe the light microscopic appearance of the hard palate
- \* Identify the features in a cross section of the hard palate under the light microscope
- \* Describe the light microscopic appearance of the soft palate
- \* Identify the features in a cross section of the soft palate under the light microscope

### **11. Functional anatomy of the pharynx**

- \* Describe the nasopharynx
- \* Describe the oropharynx
- \* Describe the laryngopharynx
- \* Describe the muscles of the pharynx
- \* Describe the blood supply to the pharynx
- \* Describe the nerve supply to the pharynx

## **Unit II: Saliva**

**The aim of this unit is to provide a comprehensive knowledge and understanding on the following aspects of saliva:**

- 1. Functional anatomy of the salivary glands**
- 2. Secretion of saliva**
- 3. Regulation of salivary secretion**
- 4. Composition of saliva**
- 5. Functions of saliva**

### **Objectives**

- 1. Functional anatomy of the salivary glands**
  - \* Describe the position and relationship of major salivary glands
  - \* Describe the morphology of major salivary glands
  - \* Describe the distribution of minor salivary glands
  - \* Describe the histology of salivary glands
  - \* Draw and label a secretory unit of a salivary gland including ducts-
    - light microscopic appearance
    - electron microscopic appearance
  - \* Identify different components of a salivary gland under the light microscope
  - \* Distinguish between the light microscopic appearance of a serous acinus and the light microscopic appearance of a mucous acinus
  - \* Distinguish between the electron microscopic appearance of a serous acinus and the electron microscopic appearance of a mucous acinus
- 2. Secretion of saliva**
  - \* Explain the glandular mechanism of salivary secretion
  - \* Explain the secretion of water

- \* Explain the secretion of electrolytes
- \* Explain the secretion of proteins

### **3. Regulation of salivary secretion**

- \* Explain the parasympathetic control of salivary secretion
- \* Explain the sympathetic control of salivary secretion
- \* Explain salivary reflexes

### **4. Composition of saliva**

- \* Describe the inorganic components of saliva
- \* Describe the organic components of saliva
- \* Explain the factors affecting the composition of saliva
- \* Discuss the differences in the composition of resting and stimulated saliva
- \* List the properties of saliva

### **5. Functions of saliva**

- \* Explain the lubricating function of saliva
- \* Explain the digestive functions of saliva
- \* Explain the solvent action of saliva
- \* Explain the protective functions of saliva
- \* Explain the buffering action of saliva
- \* Explain the contribution of saliva to tooth integrity (enamel maturation and remineralization)
- \* Discuss the effects of dry mouth

## **Unit III: Mastication**

**The aim of this unit is to provide a comprehensive knowledge and understanding on the following aspects of mastication:**

- 1. Functional anatomy of the muscles of mastication**
- 2. Functional anatomy of the temporomandibular joint**
- 3. Masticatory process**

### **Objectives**

#### **1. Functional anatomy of the muscles of mastication**

- \* Describe the attachments of muscles of mastication
  - masseter
  - medialpterygoid
  - lateralpterygoid
  - temporalis
- \* Describe the attachments of accessory muscles of mastication-  
suprahyoid
- \* Describe the blood supply to the muscles of mastication
- \* Describe the nerve supply to the muscles of mastication

#### **2. Functional anatomy of the temporomandibular joint**

- \* Describe the morphology and relations of the temporomandibular joint
- \* Describe the histology of a sagittal section of the temporomandibular joint
- \* Identify the components of a sagittal section of the temporomandibular joint under the light microscope
- \* Draw and label the light microscopic appearance of a sagittal section of the temporomandibular joint

### **3. Masticatory process**

- \* Describe the movements of the temporomandibular joint during mastication
- \* Describe the movements of mandible during mastication
- \* Describe the changes in occlusion during mastication
- \* Describe the action of masticatory muscles during mastication
- \* Explain how stability of the temporomandibular joint is maintained
- \* Describe the movements of lips, cheeks and tongue during mastication
- \* Describe the masticatory cycle and masticatory reflexes

## **Unit IV: Suckling, Swallowing and Speech**

The aim of this unit is to provide a comprehensive knowledge and understanding on the following aspects of suckling, swallowing and speech:

- 1. Suckling**
- 2. Swallowing**
- 3. Speech production**

### **Objectives**

#### **1. Suckling**

- \* Describe the mechanism of suckling
- \* Describe the effect of cleft lip and palate on suckling

#### **2. Swallowing**

- \* Describe the three stages of swallowing
- \* Describe the regulation of swallowing
- \* Describe the effect of cleft lip and palate on swallowing

#### **3. Speech production**

- \* Describe the anatomy of the larynx in relation to speech
- \* Describe speech production -phonation  
articulation  
resonance
- \* Describe the effect of cleft lip and palate on speech

## **Urinary System (BS 1204)**

The aim of this module is to provide a comprehensive knowledge and understanding on the following aspects of the urinary system:

- 1. Functional anatomy of the urinary system**
- 2. Physiological basis of formation of urine**
- 3. Role of the kidney in the regulation of extra cellular fluid volume, osmolality and composition**
- 4. Regulation of acid-base balance**
- 5. Mechanism of micturition**
- 6. Composition and characteristics of urine**
- 7. Common disorders of renal function and their effects on body function**
- 8. Effects of diuretics on tubular function**
- 9. Common tests of renal function**

### **Objectives**

- 1. Functional anatomy of the urinary system**
  - \* Describe the positional arrangement of different parts of the urinary system to each other and surface landmarks

- \* Describe the morphology of different parts/organs of the urinary system in relation to function
- \* Draw and label the macroscopic structure of the kidney
- \* Draw and label the microscopic structure of the ureters, bladder and urethra
- \* Explain the blood supply to the kidney
- \* Draw and label a diagram of a nephron to show functional components
- \* Describe the ultrastructure of different segments of the nephron in relation to function -
  - glomerular membrane
  - juxta glomerular apparatus
  - epithelium of tubular segments

## **2. Physiological basis of formation of urine**

- \* Describe the pressures in the renal circulation
- \* Discuss the dynamics of filtration through the glomerular membrane
- \* Describe the composition of glomerular filtrate
- \* Discuss the factors that affect glomerular filtration rate; filtration fraction
- \* Discuss the absorptive and secretory functions of different tubular segments
- \* Describe the auto regulation of renal blood flow and glomerular filtration rate
- \* Explain the concepts of tubular load, tubular transport maximum, plasma clearance and their clinical significance

### **3. Role of the kidney in the regulation of extra cellular fluid volume, osmolality and composition**

- \* Describe the osmoreceptor-antidiuretic hormone feedback control system
- \* Explain the mechanism for excreting dilute urine
- \* Describe the countercurrent mechanisms for secreting concentrated urine -
  - countercurrent exchange
  - countercurrent multiplier
- \* Explain the mechanism for excreting concentrated urine
- \* Explain the thirist mechanism in controlling extra-cellular fluid volume and osmolality
- \* Explain sodium excretion and its control by aldosterone
- \* Describe the renin-angiotensin feedback system for secretion of aldosterone
- \* Describe the mechanisms for blood volume control-
  - baroreceptor and low pressure receptor reflexes
  - atrial natriuretic factor
  - aldosterone
  - angiotensin
  - antidiuretic hormone
- \* Describe urea excretion
- \* Explain the control of potassium excretion and its concentration in the extracellular fluid

#### **4. Regulation of acid-base balance**

- \* Define acids and bases
- \* Explain the function of acid-base buffers -
  - bicarbonate buffer system
  - phosphate buffer system
  - protein buffer system
- \* Explain the respiratory regulation of acid-base balance
- \* Explain the renal regulation of acid-base balance -
  - hydrogen ion secretion and its regulation
  - urinary buffer systems
  - renal correction of acidosis and alkalosis

#### **5. Composition and characteristics of urine**

- \* Describe the characteristics of urine -
  - appearance
  - colour
  - smell
  - specific gravity
  - pH
- \* Describe the composition of urine
- \* Measure the specific gravity of urine using a urinometer
- \* Carry out biochemical tests for the following in urine -
  - chloride
  - phosphate
  - sulphate
  - uric acid
  - creatinine
  - urobilinogen
  - glucuronides

## **6. Mechanism of micturition**

- \* Describe the nervous connections to the bladder
- \* Describe the transport of urine through the ureters
- \* Explain the filling of bladder and bladder wall tone
- \* Discuss the micturition reflex

## **7. Common disorders of renal function and their effects on body function**

- \* Describe acute and chronic renal failure and their effects on body function
- \* Explain the effects of obstruction to urine flow
- \* Explain glycosuria, proteinuria and haematuria

## **8. Effects of diuretics on tubular function**

- \* Discuss the effects of diuretics on tubular function-
  - osmotic diuretics
  - loop diuretics
  - thiazide diuretics
  - carbonic anhydrase inhibitors
  - potassium sparing diuretics

## 9. Common tests of renal function

- \* Explain the basis of the biochemical tests for the following in urine-
  - glucose
  - protein
  - bile pigments
  - bile salts
  - urobilin
  - ketone bodies
- \* Carry out biochemical tests for the following in urine-
  - glucose
  - protein
  - bile pigments
  - bile salts
  - urobilin
  - ketone bodies
- \* Examine urine deposits and comment on the findings -
  - crystals
  - cells
  - casts
  - micro-organisms

# Reproductive System (BS 1205)

The aim of this module is to provide a basic knowledge and understanding on the following aspects of the human reproduction:

1. Functional anatomy of the male reproductive system
2. Functional anatomy of the female reproductive system
3. Male sex hormones and regulation of their secretion
4. Female sex hormones and regulation of their secretion
5. Gametogenesis
6. Female sexual cycle
7. Fertilization and implantation
8. Physiological changes during pregnancy
9. Parturition
10. Lactation

## Objectives

1. Functional anatomy of the male reproductive system
  - \* Explain the positional arrangement of the organs/ parts of the male reproductive system
  - \* Explain the morphology of the organs/ parts of the male reproductive system
  - \* Describe the basic internal structure of the testes
  - \* Draw and label the light microscopic appearance of testes

- \* Identify the features in a cross section of the testes under light microscope
- \* Functional anatomy of the female reproductive system
- \* Explain the positional arrangement of the organs/ parts of the female reproductive system
- \* Explain the morphology of the organs/ parts of the female reproductive system
- \* Describe the basic internal structure of ovaries
- \* Draw and label the light microscopic appearance of ovaries
- \* Identify the features in a cross section of ovaries under light microscope

## **2. Male sex hormones and regulation of their secretion**

- \* List the male sex hormones
- \* Describe the secretion of testosterone and its regulation
- \* Describe the functions of testosterone and development of primary and secondary sexual characteristics

## **3. Female sex hormones and regulation of their secretion**

- \* List the female sex hormones
- \* Describe the secretion of oestrogen and progesterone and their regulation
- \* Describe the functions of oestrogen and progesterone and the development of primary and secondary sexual characteristics

#### **4. Gametogenesis**

- \* Describe spermatogenesis
- \* Describe regulation of spermatogenesis
- \* Explain maturation of sperm and formation of semen
- \* Draw and label the ultrastructure of a sperm
- \* Describe oogenesis
- \* Describe regulation of oogenesis
- \* Describe maturation of an ovum
- \* Draw and label the ultrastructure of a mature ovum

#### **5. Female sexual cycle**

- \* Describe ovarian cycle and ovulation
- \* Describe hormonal changes during female sexual cycle
- \* Describe endometrial changes during female sexual cycle
- \* Describe menstruation

#### **6. Fertilization and implantation**

- \* Describe the entry of the ovum into the fallopian tube
- \* Describe the transport of sperms into the fallopian tube and fertilization of the ovum
- \* Describe the transport of the fertilized ovum in the fallopian tube
- \* Describe the implantation of the blastocyst in the uterus

#### **7. Physiological changes during pregnancy**

- \* Explain hormonal changes during pregnancy
- \* Explain the changes in metabolism, blood volume, respiration, body weight
- \* and urinary excretion during pregnancy

## **8. Parturition**

- \* Explain the mechanism of parturition -
  - onset
  - positive feedback theory
  - separation and delivery of placenta
  - involution of uterus

## **9. Lactation**

- \* Describe the development of the breast during puberty and pregnancy
- \* Describe the function of prolactin and the initiation of lactation
- \* Describe the ejection process in milk secretion

# **Nervous System (BS 1206)**

The aim of this module is to provide a sufficient knowledge and understanding on the following aspects of the nervous system:

- 1. Development of the nervous system**
- 2. Functional organisation of the nervous system**
- 3. Spinal cord and peripheral nerves**
- 4. Ascending and descending pathways**
- 5. Brain stem**
- 6. Cerebral hemispheres**
- 7. Cerebellum**
- 8. Coverings of the brain; ventricles, and CSF**
- 9. Blood supply to the CNS**
- 10. Physiology of pain**
- 11. Cranial nerves and their pathways**
- 12. Autonomic nervous system**

## **Objectives**

- 1. Development of the nervous system**
  - \* Describe the formation of neural tube
  - \* Describe the neural crest cells and their derivatives
  - \* Explain the flexures of the primitive brain

## **2. Functional organisation of the nervous system**

- \* List the divisions of the nervous system
- \* Describe the topography of the nervous system
- \* Describe the histogenesis and histology of the cells of the nervous system
- \* Draw and label the light microscopic appearance of the cells of the nervous system
- \* Identify the cells of the nervous systems under the light microscope
- \* Describe the arrangement of nerve cells and supporting cells
- \* Describe the histology of ganglia
- \* Identify the histological appearance of a ganglion under the light microscope
- \* Describe the functions of the cells of the nervous system
- \* Outline the regeneration and degeneration of nerve cells
- \* Describe the basic functions of synapses and transmitter substances
- \* Describe pre and post synaptic inhibition
- \* Describe excitatory and inhibitory post synaptic potentials

## **3. Spinal cord and peripheral nerves**

- \* Describe the topography of the spinal cord
- \* Describe the coverings of the spinal cord
- \* Describe internal structure of the spinal cord
- \* Draw and label the cross sections of the spinal cord at different levels-

cervical  
thoracic  
lumbar

- \* Identify the cross sections of the spinal cord at different levels-
  - cervical
  - thoracic
  - lumbar
- \* Describe the blood supply to the spinal cord
- \* Give a classification for nerve fibres
- \* Describe peripheral nerve endings/ receptors
- \* Describe the generation of receptor potential and its transduction
- \* Discuss receptor adaptation
- \* Describe a monosynaptic reflex - stretch reflex
- \* Explain the maintenance of muscle tone
- \* Describe polysynaptic reflexes - withdrawal reflex
- \* Describe polysynaptic reflexes - golgi tendon reflexes
- \* Discuss the supraspinal control of spinal cord reflexes

#### **4. Ascending and descending pathways**

- \* Describe the ascending tracts for pain and temperature
- \* Describe the ascending tracts for proprioception, touch and pressure
- \* Describe the descending fibres from motor cortex and the brain stem
- \* Explain the terms “upper motor neurone” and “lower motor neurone”
- \* Describe the upper motor and lower motor neurone lesions
- \* Explain the physiological basis of the clinical examination of the nervous system
- \* Perform the clinical examination of the nervous system

## **5. Brain stem**

- \* Describe the topography of the brain stem
- \* Describe the internal structure of the brain stem
- \* Draw and label the internal structure of the brain stem at different levels
- \* Describe the cranial nerve nuclei
- \* Explain the role of the brain stem nuclei and brain stem reticular formation in voluntary movements

## **6. Cerebral hemispheres**

- \* Describe the topography of cerebral hemispheres
- \* Describe the important structures of cerebral hemispheres
- \* Describe the functional areas of cerebral hemispheres
- \* Describe the white matter of cerebral hemispheres including the internal capsule
- \* Describe the cellular arrangements in the cerebral cortex
- \* Describe the diencephalon
- \* Describe the basal ganglia
- \* Describe the role of basal ganglia in motor function
- \* Describe the characteristics of Parkinson's disease and its causation
- \* Describe the limbic system

## **7. Cerebellum**

- \* Describe the topography of the cerebellum
- \* Describe the internal structure of the cerebellum
- \* Describe the functions of the cerebellum
- \* Describe the maintenance of posture, equilibrium, motor coordination and muscle tone

- \* List the clinical features in cerebellar disorders and explain the physiological basis of each of them

## **8. Coverings of the brain; ventricles and cerebrospinal fluid (CSF)**

- \* Explain the coverings of the brain and the spinal cord
- \* Describe the ventricles of the brain
- \* Describe the choroid plexuses
- \* Describe CSF secretion and circulation
- \* Describe the maintenance of intracranial pressure
- \* Describe the composition, properties and functions of CSF
- \* Discuss the blood - brain barrier and blood - CFS barrier
- \* Discuss the consequences and clinical manifestations of obstruction to outflow of CSF

## **9. Blood supply of the CNS**

- \* Describe the blood supply of the cerebral hemispheres
- \* Describe the blood supply of the brain stem
- \* Describe the blood supply of the cerebellum
- \* Describe the consequences of interruption of blood supply and patterns of infarction

## **10. Physiology of pain**

- \* Define pain
- \* State the main features of nociceptors
- \* List the stimuli that excite nociceptors
- \* Explain the physiological basis of fast pain and slow pain
- \* Trace the ascending pathways through which pain impulses are transmitted

- \* Describe the central projections of the pain pathway and explain their role in pain perception
- \* Describe the role of substance P in pain impulse transmission
- \* Describe the descending pain modulatory system
- \* List the opioid peptides that are involved in pain inhibition and describe their actions
- \* Describe actions of opioid peptides
- \* Discuss the gate control theory of pain
- \* List the methods used in pain control and explain their physiological basis
- \* Explain the mechanisms of referred pain

### **11. Cranial nerves and their pathways**

- \* Describe the intracranial pathways of the cranial nerves
- \* List the functional components of the cranial nerves
- \* Explain the basis of tests for cranial nerve functions
- \* Perform the tests for cranial nerve functions

### **12. Autonomic nervous system**

- \* Describe the sympathetic and parasympathetic nervous systems-  
     outflow from the CNS  
     pre and post ganglionic fibres  
     neurotransmitters  
     receptors
- \* Describe the functions of the sympathetic nervous system
- \* Describe the functions of the parasympathetic nervous system

\* Describe the stimulatory and inhibitory drugs that act on the autonomic receptors-

adrenaline

atropine

propranolol

# Special Senses (BS 1207)

The aim of this module is to provide a basic knowledge and understanding on the following aspects of vision, hearing, taste and smell:

## Unit I: Vision

The aim of this unit is to provide a basic knowledge and understanding on the following aspects of vision;

1. Development of the eye
2. Functional anatomy of the eye lid
3. Orbit and its contents
4. Functional anatomy of the eye
5. Principles of optics
6. Receptor and neural function of retina
7. Central neurophysiology of vision
8. Common tests of visual function

## Objectives

1. Development of the eye
2. Functional anatomy of the eye lid
  - \* Describe the histology of the eyelid
  - \* Describe the muscles of the eyelid

- \* Identify the components of a sagittal section of the eyelid under the light microscope
- \* Draw and label the light microscopic appearance of a sagittal section of the eye lid
- \* Describe the blood supply and nerve supply to the eyelid

### **3. Orbit and its contents**

- \* Describe the osteology of the orbit
- \* Describe the arrangements/attachments of extra ocular muscles
- \* Describe the action of extra ocular muscles
- \* Describe the blood supply to the orbital contents
- \* Describe the nerve supply to the orbital contents

### **4. Functional anatomy of the eye ball**

- \* Describe the structure of the eyeball
- \* Describe the blood supply within the eyeball
- \* Draw and label the appearance of a sagittal section of the eye ball
- \* Identify the components of the eye in a model
- \* Describe the fluid system in the eye and maintenance of intraocular pressure
- \* Describe the histology of the retina
- \* Identify the components of the retina under the light microscope

## **5. Principles of optics**

- \* Describe the principles underlying optics of vision -
  - refraction
  - focal length
  - refractive power
  - image formation
  - visual acuity
- \* Explain the errors of refraction
- \* Explain the basis of correcting the errors of refraction
- \* Discuss accommodation
- \* Explain the accommodation / convergence reflex

## **6. Receptor and neural function of the retina**

- \* Describe the rhodopsin - retinal visual cycle
- \* Describe the ionic basis of photoreceptor potentials and generation of visual impulse
- \* Describe the photochemistry of colour vision
- \* Explain the basis of colour blindness
- \* Explain light adaptation and dark adaptation

## **7. Central neurophysiology of vision**

- \* Describe the visual pathway from the retina to the visual cortex
- \* Draw and label a diagram of the visual pathway
- \* Describe the effects of lesions in the visual pathway -

- \* optic nerve
  - optic chiasma
  - optic tract
  - optic radiation

- \* Explain the light reflex

## **8. Common tests of visual function**

- \* Describe and perform the tests of visual acuity -
  - Snellen chart
  - Jaegers chart
- \* Describe and perform tests for the assessment of visual fields
  - confrontation method
  - perimetry
- \* Describe and perform tests for colour vision -
  - shiharacolour plates
  - Holmgren's chart
- \* Describe the principles of ophthalmoscopy
- \* Examine the retina using an ophthalmoscope
- \* Perform the test for light reflex

## **Unit II: Hearing and Equilibrium**

The aim of this unit is to provide a basic knowledge and understanding on the following aspects of hearing and equilibrium:

- 1. Development of the ear**
- 2. Functional anatomy of the ear**
- 3. Conduction of sound waves to the organ of Corti**
- 4. Receptor function of the organ of Corti**
- 5. Central neurophysiology of hearing**
- 6. Tests of hearing**
- 7. Vestibular functions**

### **Objectives**

- 1. Development of the ear**
- 2. Functional anatomy of the ear**
  - \* Describe the external ear
  - \* Describe the middle ear and its relations
  - \* Describe the internal ear -
    - cochlea
    - vestibular apparatus
    - vestibulo-cochlear nerve
  - \* Identify the components of the ear in a model

### **3. Conduction of sound waves to the organ of Corti**

- \* Describe air conduction of sound waves
- \* Describe bone conduction of sound waves
- \* Describe the transmission of sound waves in the cochlea

### **4. Receptor function of organ of Corti**

- \* Describe the mechanism of excitation of hair cells
- \* Describe the generation of the auditory impulse

### **5. Central neurophysiology of hearing**

- \* Trace the auditory pathway from the auditory nerve to the auditory cortex

### **6. Tests of hearing**

- \* Explain conduction deafness and nerve deafness
- \* Explain the principles of Weber's and Rinne's tests
- \* Perform the Weber's and Rinne's tests
- \* Describe the principles of audiometry
- \* Use an audiometer to assess auditory acuity
- \* Interpret an audiogram

### **7. Vestibular functions**

- \* Describe the function of -
  - semicircular canals
  - utricle
  - sacculle
- \* Describe the afferent and efferent connections of the vestibular nuclei

- \* Describe the contribution of the vestibular apparatus and the vestibular nuclei to maintenance of posture and balance
- \* Explain the physiological basis of nystagmus

## **Unit III: Taste and Smell**

**The aim of this unit is to provide a sufficient knowledge and understanding of taste and smell:**

- 1. Taste sensation**
- 2. Olfactory sensation**

### **Objectives**

#### **1. Taste sensation**

- \* Describe the functional anatomy of a taste bud
- \* Describe the distribution of taste buds
- \* Describe the taste threshold and receptor stimulation
- \* Describe the taste pathways
- \* Describe the taste-salivatory reflex

#### **2. Olfactory sensation**

- \* Describe the functional anatomy of the olfactory mucosa
- \* Explain the stimulation of olfactory receptors
- \* Describe the olfactory pathway

# Host Defence (BS 1208)

The aim of this module is to provide a sufficient knowledge and understanding on the following aspects of basic immunology:

1. Functional anatomy of the immune system
2. Innate immunity
3. Specific acquired immunity

## Objectives

### 1. Functional anatomy of the immune system

- \* Give a classification for lymphocytes
- \* Describe histological features of lymphocytes
- \* Describe the histology and distribution of accessory cells of immune function -
  - macrophages
  - langerhan cells
- \* Outline the lymphatic system in the body and describe in detail the distribution of lymph nodes in the head and neck region
- \* Give a classification for the lymphoid tissues in the body
- \* Describe the distribution of lymphoid tissues in the gastrointestinal tract
- \* Describe the histology of lymph nodes , thymus , spleen , tonsils and primary solitary lymphatic nodule

- \* Identify the histological appearance of a cross section of a lymph node, thymus, spleen, tonsils and primary solitary lymphatic nodule under the light microscope
- \* Draw and label the light microscopic appearance of a cross section of a lymph node, thymus, spleen, tonsils and primary solitary lymphatic nodule

## **2. Innate immunity**

- \* Describe the role of mechanical barriers in innate immunity
- \* Describe the role of body fluids/chemicals in innate immunity
- \* Describe the role of phagocytic cells in innate immunity
- \* Describe extra-cellular killing -
  - natural killer cells
  - eosinophils
- \* Describe the complement system and its activation
- \* Describe the role of complements in innate immunity

## **3. Specific acquired immunity**

- \* Describe an antigen
- \* Define an antibody
- \* Describe the basic structure of an antibody
- \* Describe the different types of antibodies
- \* Describe the cellular basis of antibody production
- \* Describe the nature of an antigen-antibody reaction
- \* Describe the major histocompatibility complex (MHC)
- \* Describe the major histocompatibility complex class I molecules and their tissue distribution

- \* Describe the major histocompatibility complex class II molecules and their tissue distribution
- \* Describe the antigen receptor on B lymphocyte
- \* Describe the antigen receptor on T lymphocyte
  
- \* Describe antigen presentation by accessory cells
- \* Describe the development of humoral immune response
- \* Describe the development of cell-mediated immune response
- \* Describe the immunisation and secondary immune response
- \* Describe the regulation of immune response
- \* Compare and contrast innate immunity and humoral immunity

## Recommended Text Books (2<sup>nd</sup> Semester)

### Anatomy

10. Clinical Neuro Anatomy by Richard S. Snell.
11. Clinical Oriented Anatomy by K. L. Moore
12. Grant's Atlas of Anatomy by A.M. R. Agur and A. F. Dalley.
13. Grey's Anatomy, The Anatomical Basis of Clinical Practice edited by S. Standing.
14. Illustrated Anatomy of the Head and Neck by M.J. Fehrenbach and S.W. Herring.
15. Langman's Medical Embryology by T.W. Sadler
16. Last's Anatomy. Regional and Applied edited by C.S. Sinnathambi
17. McMinn's Clinical Atlas of Human Anatomy by T.H. Abrahams.
18. Wheater's Functional Histology. A Text and Color Atlas by B. Young
19. Histology: A Text and Atlas with Correlated Cell and Molecular Biology 5<sup>th</sup> Edition by Michael H. Ross & Wojciech Pawlina, Lippincott Williams & Wilkins.

### Dental Anatomy

4. Oral Anatomy, Histology and Embryology by B.K.B. Berkovitz et.al.
5. Ten Cate's Oral Histology, Development, Structure, and Function by A. Nanci
6. Wheeler's Dental Anatomy, Physiology, and Occlusion by M.M. Ash and S.J. Nelson

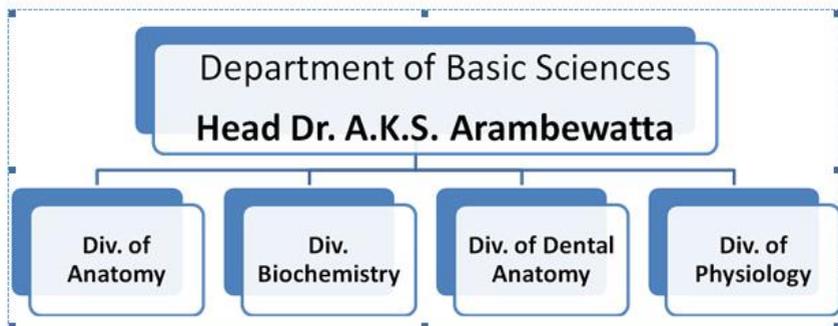
### Physiology

4. Essentials of Oral physiology by R.M. Bradley
5. Review of Medical Physiology by W.F. Ganong
6. Textbook of Medical Physiology by A.C. Guyton and J.E. Hall
7. Berne & Levy Physiology by Koeppen B.M & Stanton B.A
8. Clinical Oral Physiology by Miles T.S

### Biochemistry

6. Biochemistry (Lippincott's Illustrated Reviews Series) by Pamela C. Champe, Richard A Harvey
7. Food and Nutrition by T. W. Wickremanayaka

8. Harper's Illustrated Biochemistry by Murray et.al.
9. Lecture notes in Medical Genetics by J. Bradley, D. Johnson, B. Pober.
10. Text Book of Biochemistry for Dental Students by D. M Vasudevan, Srikumari S



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