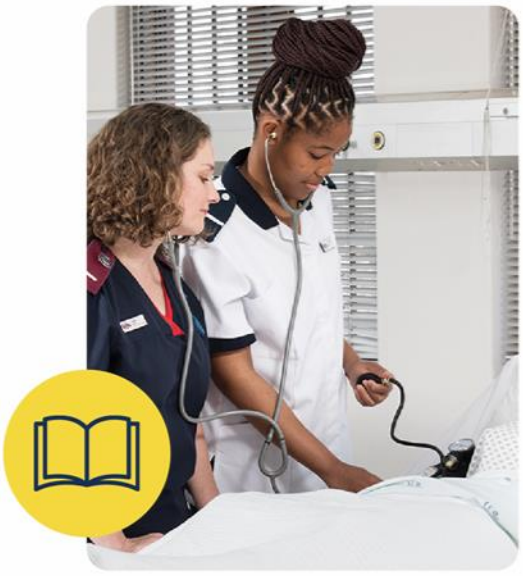
Life Healthcare
NURSING COLLEGE
Life Healthcare Group (Pty) Ltd
EDUCATION FOR SERVICE EXCELLENCE



MODULE GUIDE

BIOLOGICAL AND NATURAL SCIENCE

DIPLOMA IN NURSING – 1ST YEAR

Life Healthcare

Making life better

Contents

PART A: GENERAL INFORMATION

1. Introduction to this module

Welcome to the Anatomy and Physiology (A&P) module for the for the Diploma in Nursing (R171) first year programme. You would have gone through the college induction at this stage and therefore we hope that you have a good understanding of the college processes and all the structures we have in place to help support you in your studies.

The module prepares the student to be able to identify and understand the structures that make up the human body and the normal function of the human body to maintain homeostasis.

Success will only be achieved through commitment to your studies!

Your Nurse Educators wish you well.

2. Purpose of the module

The module in Anatomy and physiology is an 18-credit core learning module on NQF level 5 which prepares the student to function as a competent nurse practitioner. The student will be equipped with the knowledge to apply the understanding of anatomy and biophysical functioning of the human body ethically and legally in the daily nursing care of individual patients of different age groups and with different health conditions as well as in different contexts i.e., the family, the local community, and the global community.

Knowledge gained will include the application of the understanding of normal physiological, biochemical, and biophysical functioning of all body systems including, but not limited to the reproductive, cardiovascular, endocrine, haematology and peripheral vascular systems. Knowledge of the normal will enable the student to recognise the abnormal in the clinical setting ensuring quality patient care as well preparing the student for application to disease processes encountered during the second year of the programme. Knowledge gained will contribute to other theory modules e.g., General Nursing Care and Introduction to Pharmacology as well as contributing to clinical skills required for the general nursing care of a patient e.g., comprehensive patient assessment and observation of vital signs. Exit level of this module will lead to the development of a student with in-depth understanding, the ability to provide comprehensive explanations as well as being able to apply nursing theory and practice.
NB: Systems to be covered: refer to the number 8-module units/themes table)

3. Overview of the module

Anatomy is the study of the structure of the human body and physiology is the study of the function of the human body. In order to provide appropriate, adequate and effective nursing care you must be able to perform a comprehensive physical assessment of your patient and plan the appropriate nursing care. When caring for your patient you need to understand how the body systems function in terms of mechanical, chemical and bioelectrical processes. Therefore, it is imperative that you have an in-depth understanding of the anatomy and physiology covered in this module.

4. Teaching staff

Learning Centre	Name	Email address	Role	Consultation times
Cape Town	M. Radyn	Margaretha.Radyn@lifehealthcare.co.za	LC Support	By appointment
East London	M. Zondi	Meluleki.Zondi@lifehealthcare.co.za	LC Support	By appointment
East Rand	B. Sithole	Busisiwe.Sithole2@lifehealthcare.co.za	LC Support	By appointment
Kwa-Zulu Natal	Y Beepat	Yvonne.Beepat@lifehealthcare.co.za	Educator & Coordinator	8h00 – 15h00
Port Elizabeth	Vacant		LC Support	By appointment
Pretoria	N. Nare	Neo.Nare@lifehealthcare.co.za	LC Support	By appointment
West Rand	C. le Roux	Christina.leRoux@lifehealthcare.co.za	Educator	8h00 – 15h00

5. Communication channels

The following channels of communication are to be followed in the event of any problems related to your programme:

1) Your Nurse educator

2) Your programme guardian (the educator that oversees the 1st year programme in your learning center)
3) The Regional Education Manager
4) The Undergraduate Programme Manager

The following channels of communication are to be followed in the event of any problems related to your technical related issues regarding e-learning platforms:

1) Your Nurse educator
2) The Regional Education Manager

6. Timetable

- Please note class contact sessions will be arranged according to the study schedule (see Section D)
- Please be aware that classes commence at 07:00 – 16:00 with a tea and lunch break, daily.
- Please observe the academic year plan that will be provided to you.

PART B: QUALIFICATION BREAKDOWN AND OUTLINE OF THE MODULE CONTENT

7. Qualification breakdown

The exit level outcomes are the outcomes to achieve the qualification and are the generic standards for the specific qualification. The subjects are therefore aligned to the exit level outcomes so that the student can achieve the required outcomes by the end of the training period.

SUBJECT	CREDIT	Exit level outcome
General Nursing Science (Core)	302	Provide nursing care throughout the life spans in various healthcare settings Use & maintain healthcare information systems for nursing practice Manage a healthcare unit by implementing the management process Provide reproductive health care to promote and maintain optimum health of individuals and families Participate in addressing the needs of individuals, groups and communities
Foundations of Nursing Practice (core)	26	Render nursing care within a legal and ethical framework
Biological & Natural Sciences (core)	18	Apply knowledge of natural and biological sciences in nursing practice
Applied Psycho-social Sciences (Fundamental)	15	Apply knowledge of psycho-social sciences in the practice of nursing
Pharmacology (Fundamental)	15	Apply knowledge of pharmacology in nursing practice
Total	**376**	

- Core: is the essence of the qualification i.e., the essential elements of the profession you are studying towards.
- Fundamental: is the knowledge and skills that will be used throughout the programme and in professional practice.

The national Critical Cross Field Outcomes:

These are generic outcomes that all education and training programmes have to include. The aim is to ensure that student does not only develop the qualification knowledge, skills and attitudes but also skills that will make him/her a better citizen, community member and individual.

Critical Cross Field Outcomes	Contextualised in Curriculum
Identifying and solving problems using critical and creative thinking	Apply basic knowledge of nursing and apply problem-solving skills, critical thinking and creative thinking skills when providing nursing care to different individuals and age groups, in various settings
Working effectively with others to develop collaboration within the multidisciplinary team	As a member of the multidisciplinary patient care team understand and respect the different roles and responsibilities of the different team members. Provide information and collaborate as needed to ensure

Critical Cross Field Outcomes	Contextualised in Curriculum
	optimum patient care and a good working relationship within the health care teams and communities
Organising and managing oneself and one's activities responsibly and	Apply time management skills learnt in planning the daily routine, carrying out specific tasks in an organised, efficient,
effectively	cost effective, accountable and timely manner
Collecting, analysing, organising and critically evaluating information	Critically evaluate and analyse data collected and respond, mitigate and address any variances, efficiently and appropriately within the given circumstances
Communicate well orally and in writing	Documentation and good communication in the language of the institution is paramount in nursing practice and forms part of all aspects of practice. Communication skills learnt are applied daily in written and oral forms in practice as a nurse
Use science & technology responsibly	Use basic computer skills learnt effectively. Use the technical/electronic equipment for patient care safely and correctly. Be aware of the effect technology has on the environment and people and prevent negative effects thereof
Understand the world is a set of related systems	Understand the systems approach to nursing, in which the patient is treated effectively, appropriately and holistically within the cultural, social, political and economic system. In implementing nursing care the nurse is dependent on team decision making and planning. Holistic patient care is provided which includes recognizing the patients' family
Explore strategies to learn more effectively	Apply the study skills learnt in planning own study future studies process and uses reflective practice skills to improve own daily practices.
Participate as responsible citizens in community life	Participate in the community involvement project at the College throughout training period and apply knowledge of community health when working in the community
Be culturally & aesthetically sensitive	Apply the skills learnt when interacting with patients and colleagues of different races, cultures, religions and social standing in daily practice as a nurse
Explore education & career opportunities	Understand the career pathways available to nurses and actively seek to develop personally and professionally

Programme Credit Breakdown

The following is a summary of the first-year programme of the credit allocation per subject. Refer to the annual programme planner for the full academic programme.

Subject	Level	Credit
General Nursing Science (GNS)	5	92
Foundations of Nursing Practice (FNP)	5	16
Biological & Natural Sciences (BNS)	5	8
Applied Psycho-social Science (APS)	5	4
Pharmacology (Pharm)	5	5
TOTAL CREDIT		**125**

Subject	Theory		Work Integrated Learning	
	Theory	Reflexive	Simulation	WBL
GNS	352	12	172	364
FNP	100	11	9	40
BNS	75	5	0	0
APS	27	7	6	0
Pharm	45	5	0	0
TOTAL	**599**	**40**	**187**	**404**
	639		**591**	

The 1230 hours are divided into theory, reflective learning, simulation and work-based learning (WBL) hours as follows:

Work based learning refers to learning that takes place in the clinical environment i.e., hospitals and clinics. The aim of students working in the clinical environment is to ensure that they can apply the theory learnt in class in the actual real-world setting. Working with patients will help students develop their practical and attitude (soft) skills. There are 3 types of allocation when the student is placed in the units:

- **Clinical learning:** Students receive clinical outcomes that have to be met and are allocated to observe, practice, and assist with skills and procedures that meet the outcomes. This is done under the supervision of a registered staff nurse, professional nurse, or allocated mentor in the nursing unit. The students work with patients but do not form part of any clinical service team. The direct support of students is in the form of direct guidance by a clinical specialist or accompaniment by a clinical supervisor.
- **Role taking:** After students are found competent through formal assessment and following adequate guided practice they are allowed to practice as part of the clinical service team where they are allocated tasks in the provision of daily patient care and practice as a team member under indirect supervision.
- **Clinical accompaniment:** A deliberate, planned, and structured process to provide direct assistance and support to the students by a dedicated clinical training specialist, to ensure the achievement of learning outcomes.
- **Simulation:** refers to the acting out or mimicking of an actual or probable real-life condition, event, or situation to find a cause of a past occurrence (such as an accident), or to forecast future effects (outcomes) of assumed circumstances or factors (SANC, 2013).

Pre knowledge

- A basic understanding and skill in the use of the internet, Microsoft office, downloading documents and videos is essential.
- A good understanding of the English language is required, and it is advisable to get a good medical dictionary to assist with the new medical terminology you will be introduced to.

8. Module study units/themes

Exit Level Outcome: On successful completion of this module, the student will be able to render nursing care within a legal and ethical framework.

Learning Outcomes	Specific Learning Outcomes (SLO)
1. Apply understanding of the anatomy and bio-physical functioning of the human body in daily nursing care of patients of different age groups with different health conditions 2. Apply understanding of normal physiological, biochemical, and biophysical functioning of all body systems	**Semester 1**
	1.1. Introduction to Anatomy and Physiology 1.2. Orientation to the Human Body 1.3. Cells, Tissues, and Membranes
	1.4. Integumentary System 1.5. Cardiovascular System 1.6. Respiratory System
	Semester 2
	1.7. Musculoskeletal System 1.8. Urinary System, Fluid, Electrolyte and Acid Base Balance 1.9 Nervous System 1.10 Special senses 1.11 Digestive System, Metabolism and Body Temperature Regulation 1.12 Lymphatic System 1.13 Immune System 1.14 Endocrine System 1.15 Reproductive System 1.16 Introduction to Genetics

PART C: TEACHING, LEARNING AND ASSESSMENTS

9. Teaching and learning strategy

A blended teaching and learning approach are strategies followed to enhance student-centeredness. These strategies may include direct and e-learning instructions, cooperative learning, activity-based strategies, independent learning, case studies and portfolio will be utilised. Examples of such strategies are:

Direct instructions:

- Formal lectures to clarify core concepts and principles. Active student participation is encouraged.
- Demonstrations on manikins for example how to assess the cardiovascular system.
- Videos
- Interactive presentations

E-learning instructions:

- Moodle
- Narrated PowerPoint Presentations
- Primal Pictures and PALMS

Cooperative learning strategies:

- Peer teaching
- Group work
- Interprofessional Education
- Discussion groups

Activity-based strategies:

- Integration of theory and practice while placed for work integrated learning through applying the principles of the BNS module.

Independent learning:

- Reflection
- Independent reading
- Portfolio completion

Case studies

- Report presentation

10. Assessment strategy

Biological and Natural Sciences is a non-exit level module that will be assessed continuously using various assessment instruments, methods, and tools throughout the semester. The purpose of assessment is to (1) monitor the level of learning taking place (diagnostic), (2) enhance learning and to (3) establish whether the student has achieved the required learning outcomes in the various units of the module.

The assessment strategy followed in this module includes diagnostic, formative, and summative assessments to identify misconceptions, provide feedback to students on academic progress and for formal assessment. The objective is to assess students using a multitude of differing assessment methods, to provide evidence of learning which has been assessed with valid, reliable and authentic instruments and techniques. These assessment methods include questioning, case report and observation methods. The module will require six formative credit bearing assessments. The credit bearing formative and summative assessments spread throughout the semester, consist of:

Continuous Assessment

Pre-class activity for each system / unit covered (20%) per semester

In-class / post-class activities (30%) per semester

Portfolio in 2 parts – 1 per semester (50%) per semester

Portfolio to consist of five activities per semester with the aim to develop graduate attributes and achieve application of knowledge to General Nursing Science

Activities to focus on specific SLOs and to include rubrics for assessment

The scores obtained in the sixteen formative assessments will be collectively calculated to make up 50% of the final semester mark. The summative assessment will consist of a portfolio due at the end of each semester during the college's end of semester examination period and will contribute 50% to the final semester mark. The two semester marks will contribute 50% to the final year mark.

Diagnostic and formal assessment throughout the semester will consist of student presentations, case study discussions, informal individual online pre-class activities or quizzes and individual and / or group in-class activities consisting of quizzes, tests, PALMS, mind maps etc. with a final written portfolio. In order to develop reflective thinking skills. The nurse educator, the peer group and self-reflection on learning by the individual student will provide feedback on theory to the student.

Students will receive immediate feedback for all formative online pre-class activities in writing and verbally and within five working days of completion pre-class & post-class activities. The marks will be entered into the Electronic Student Management System (ESMS) for students to track their progress throughout the semester.

Feedback will enable students to understand what was expected and how they can improve their performance to meet the outcomes of the specific units and module.

Answer Guides will be discussed in detail with students.

Individual discussions between Nurse Educator and students will be encouraged. Evidence of the abovementioned formative and summative assessments will be kept in the electronic module file which is kept at the College's Archives as well as being recorded on College's ESMS. Summative assessment results will be published in accordance with the College's' assessment and moderation policy.

11. Assessment plan

Assessment Type	Description	Method	Weighting (%)	Due Date
Semester 1				
Pre-class activity (discussion forum, worksheet, online quiz, PALMS, group presentation)	Moodle pre-class activities: Block 1: SLO 1.2 + 1.3 + 1.4 + 1.5 + 1.6 (25 marks)	LMS Checklist / Rubric	20%	During block 1
Post-class activity - Online quiz, PALMS worksheet, group presentation)	Moodle post-class quiz (10 marks each) Block 1: SLO 1.2 + 1.3 (20 marks)	Memo, Rubric	30%	After block 1
PoE Part 1	Online submission of portfolio (30 marks) SLO 1.1 + 1.2 (use of terminology throughout PoE completion) Block 1: SLO 1.4 + 1.5 + 1.6	Rubric	50%	After block 1
Semester 2				
Pre-class activity (discussion forum, worksheet, online quiz, PALMS, group presentation)	Moodle pre-class activities: Block 2: SLO 1.7 + 1.8 + 1.9 + 1.10 + 1.11 + 1.12 (30 marks) Block 3: SLO 1.13 + 1.14 + 1.15 + 1.16 (20 marks)	LMS Checklist / Rubric	20%	During block 2 and 3
Post-class activity - Online quiz, PALMS worksheet, group presentation)	Moodle post-class quiz (10 marks each) Block 2: SLO 1.9 + 1.10 + 1.12 (30 marks) Block 3: 1.13 + 1.15 + 1.16 (30 marks)	Memo, Rubric	30%	After block 2 and 3
PoE Part 2	Online submission of portfolio (40 marks) SLO 1.1 + 1.2 (use of terminology throughout PoE completion) Block 2 + 3: SLO 1.7 + 1.8 + 1.11 + 1.14	Rubric	50%	After block 2 and 3

12. Pass requirements

The summative assessment in the form of a portfolio consisting of two parts, one for each semester will be available to students at the beginning of the semester and handed in at the end of the semester during college examination week.

A 50% average is required from the pre-and post-class activities and 50% for the written assignment to pass the semester.

Marks will be calculated as follows:

Final Semester Mark = Pre-class activity (20%) + post-class activity (30%) + PoE (50%0

A final mark of 50% is required to pass.

Re-assessment requirements in accordance with the College's assessment and moderation policies will be applied.

13. Internal and external moderation

All assessments will be done according to the following policies/procedures:

- Assessment Policy for R.169 (LCL-POL-AS-007)
- Moderation Policy (LCL-POL-AS-003)
- Assessment Procedure (LCL-WP-AS-006)
- Marking of scripts Procedure (LCL-WP-AS-001)

14. Prescribed textbooks and recommended readings

Author	Title	Edition	Publishing year	Publisher
Minett, P and Ginesi, L	Anatomy and Physiology: An introduction for nursing and healthcare	1st	2023	Juta

15. Class attendance

Biological Natural Science is a compulsory online subject. It will be presented in a virtual classroom.
Virtual classroom attendance is compulsory and the following rules will apply:

1) Students are allowed to attend a virtual classroom from home or off site provided that:
   - Each student logs on using their own device. The rationale is that attendance cannot be accurately tracked if students share a device.
   - Students who do not have a suitable device will attend from their respective Learning Centre using the computers in the media lab.
   - Students connecting from home need to ensure they have stable, continuous internet connection with appropriate bandwidth to allow for uninterrupted connection to the virtual class.
2) Students need to be aware of their load shedding schedule. Absence due to load shedding will be marked as "Absent ". If there is scheduled load shedding during planned virtual class times, students are required to attend class at the Learning Centre or another appropriate venue where connection is uninterrupted.
3) Students who are absent during a virtual lesson, will need to provide evidence that they have completed the outcomes within a reasonable time as stipulated by the Nurse Educator.

Attendance Management

1) Online attendance will be managed through a Microsoft Forms link that will be shared with the students by the educator presenting the class.
2) This attendance will be signed by each student 3 times during the virtual session to remain in line with SANC requirements of attendance management.
3) The educator responsible for the classroom will pull a collated attendance register at the conclusion of the virtual class and distribute the register to the educators at each learning centre.
4) Absenteeism will be managed by the educators responsible for the subject at the individual learning centre

PART D: STUDY SCHEDULE

The study schedule describes the class schedule and academic plan for meeting the learning outcomes (LO). This module will be presented as an online module; thus all the classes are attended virtually.

SEMESTER 1

Theory Block 1 (week 3): 17 – 21 Feb **Biological and Natural Science – Anatomy and Physiology**					
Facilitated Activities				**Self-Directed activities**	
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
Monday	**1.1 INTRODUCTION TO ANATOMY AND PHYSIOLOGY** <u>Overview of the Module</u> Systems to be covered How to use resources Assessments <u>Definition of Terms</u> Anatomy Physiology Chemistry Physics Developmental stages <u>Language of Anatomy</u> • Medical terminology • Common prefixes, suffixes, and roots • Directional terms • Regional terms • Body planes • Body regions • Body cavities and their organs • Movements of body parts	2	2	General Nursing Science Activities of daily living	Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Chapter 1* <u>Access to online resources:</u> Anatomy.TV Moodle Power point Primal Pictures Digital Library https://worksheets.theteacherscorner.net/make-your-own/crossword/
	Self-directed learning Complete pre-class activity for SLO 1.2		1		
	1.2 Orientation to the human body • Levels of structural organization • Survival needs of the body • Overview of negative vs positive mechanisms to maintain homeostasis		1		Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Chapter 1* Online video – Homeostasis and Human body Systems
	Self-directed learning Complete pre-class activity for SLO 1.3		1		

Theory Block 1 (week 3): 17 – 21 Feb Biological and Natural Science – Anatomy and Physiology					
	Facilitated Activities			**Self-Directed activities**	
	1.3 Cells, tissues & membranes <u>The Cell</u> • Structure • Function of the cell and organelles • Growth and reproduction • Meiosis vs Mitosis • Transport across the membrane <u>Tissues</u> • Type, function & location of tissues <u>Membranes</u> • Type & location of membranes <u>Homeostatic imbalances</u> <u>Definitions:</u> • Tumour • Malignant • Benign		2		Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Chapter 1* <u>Access to online resources:</u> Anatomy.TV Moodle Primal Pictures Digital Library Group discussion
Tuesday	**Self-directed learning** Complete pre-class activity for SLO 1.4		1		
	1.4 Integumentary system • Gross anatomy & accessory structures • Function of the skin and accessory organs • Wound healing • Effect of aging • Definitions of homeostatic imbalances		2		Minett, P and Ginesi, L, 2023. Anatomy and Physiology: An introduction for nursing and healthcare. Chapter 3 p 25 - 32 **Anatomy.TV** <u>Human Anatomy and Physiology - Integumentary system</u> - Skin Wound Healing video <u>Human Anatomy and Physiology - Integumentary system</u> - Integumentary System Ageing **Moodle** Pre- and Post – Class Quiz
	Self-directed learning Complete pre-class activity for SLO 1.5		1		
	1.5 Cardio-vascular system **1.5.1 The heart** • Location • Orientation • Surrounding structures • Structure - Macro-anatomy • Cardiac muscle overview (refer to tissues) • Pulmonary vs Systemic circulations • Coronary circulation	2-3	3	General Nursing Science (GNS) Blood pressure Pulse ECG Activity of daily living – hygiene Pressure ulcers	
Wednesday	• Conduction system relate to ECG • Factors influencing HR + BP • Heart sounds related to valve action (“lub-dub”)	2-3	5		Minett, P and Ginesi, L, 2023. Anatomy and Physiology: An introduction for nursing and healthcare. Chapter 5 p65 – 91

Theory Block 1 (week 3): 17 – 21 Feb Biological and Natural Science – Anatomy and Physiology					
	Facilitated Activities			**Self-Directed activities**	
	• Cardiac cycle & phases • Cardiac output: formula, relation to BP **1.5.2 The blood** • Composition • Function • Groups + typing • Blood Clotting **1.5.3 Blood vessels** • Arterial + venous systems • Structure • Function • Systemic blood flow pathway • Blood flow • BP + venous resistance • Tissue perfusion • Capillary blood flow • Age-related changes • Definitions of homeostatic imbalances				. Access to online resources: **Anatomy.TV** Human Anatomy and Physiology - Cardiovascular system - Cardiac Cycle Video Human Anatomy and Physiology - Cardiovascular system - Cardiac Conduction System Video Human Anatomy and Physiology - Cardiovascular system - Changes with Ageing **Moodle** Pre- and Post – Class Quiz
	Self-directed learning Complete pre-class activity for SLO 1.6		1		
	1.6 Respiratory system • Terminology • Ventilation vs respiration	2-3	1	GNS Blood pressure, pulse, respiration, and saturation Oxygen therapy	Minett, P and Ginesi, L, 2023. Anatomy and Physiology: An introduction for nursing and healthcare. Chapter 6 p103 - 106 Access to online resources: **Anatomy.TV** Human Anatomy and Physiology - Respiratory system - External Respiration Video Human Anatomy and Physiology - Respiratory system - Internal Respiration Video
Thursday	• Function • Structures + functions • Pulmonary circulation • Mechanism of breathing • Internal respiration • Transport of O_2 + CO_2 by the blood • Neural control of respiration • Factors affecting rate and depth of breathing	2-3	7		Minett, P and Ginesi, L, 2023. Anatomy and Physiology: An introduction for nursing and healthcare. Chapter 6 p103 - 106 Access to online resources: **Anatomy.TV** Human Anatomy and Physiology - Respiratory system - Effects of Ageing

Theory Block 1 (week 3): 17 – 21 Feb Biological and Natural Science – Anatomy and Physiology					
Facilitated Activities				**Self-Directed activities**	
	• Effects of ageing • Definitions of homeostatic imbalances				**Moodle** Pre- and Post – Class Quiz
Friday	**Self-directed learning** Complete post-class activity for SLO 1.2 and 1.3		4		
	Reflection – 4 hours Think about the systems covered this week – how can you make Anatomy more understandable by referring to your own body				

Clinical block 1 (week 5 - 7): 3 - 11 March Please refer to your Standard Clinical Facilitation plan for clinical learning. The below Self-directed activities should be completed at home/learning centre/library – you will need to provide proof to your NED/CTS that you have completed the work			
Date	**Self-directed activity**	**Blooms**	**Periods**
w/o 3 March	**Hospital Induction** Follow the induction plan at your allocated hospital NB – To complete the Privacy training on Moodle (FNP LO 6.1) • Submit the completion certificate to your NED		42 hours
w/o 10 March	GNS SDL (see module guide)	2-3	10
	Computer skills Access the Digital literacy course on Moodle and complete the following topic • Microsoft word	3	2
Friday 21 March **PH**	GNS SDL (See module guide)	2-4	5
	BNS SDL **All post class activities have to be completed by 21 March** **BNS Participation activity completed**	2-3	5
	Study Skills Workshop Access the study skills workshop on Moodle and complete the following topics • Writing a test • Memory	3	2

Theory Block 4 (week 27): 25 – 29 August **Biological and Natural Sciences**					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
Monday	**Self-directed learning** Complete pre-class activity for SLO 1.7		1		
	1.7 Musculo-skeletal system **Terminology** • Axial vs Appendicular skeleton • Compact vs spongy bone • Articulating surface • Cartilage • Osteoblast • Osteoclast • Ligaments vs tendons Range of Motion (See Introduction to A&P) 1.7.1 Bones • Functions • Types • Structure • Location + function of bones of the: • Skull • Spine • Thoracic cage • Upper limbs + shoulder girdle • Lower limbs + pelvic girdle Bone Growth Factors • Hormonal regulation • Exercise • Diet Bone Remodelling + Bone Healing • Difference • Factors delaying fracture healing 17.2 Joints • Types & Characteristics: • Fibrous • Cartilaginous • Synovial • Movements 17.3 Muscles	2-3	6		Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Chapter 4* Anatomy TV Muscular system Skeletal system PALMS (Instruction on Moodle) Pre Class-Quiz

Theory Block 4 (week 27): 25 – 29 August Biological and Natural Sciences					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
	• Types of muscle tissue • Structure • Function Name the muscles of the: • Trunk • Pelvic floor • Lower limb • Shoulder • Upper limb <u>Effects of ageing Homeostatic imbalances</u> • Osteoporosis • Paget's disease • Osteomyelitis • Rheumatoid arthritis • Osteoarthritis • Sprains • Strains • Dislocations • Fractures				
Tuesday	**Self-directed learning** Complete pre-class activity for SLO 1.8		1		
	1.8 **Urinary system** Terminology • Nephrons • Micturition • Osmolality • Acid base homeostasis <u>Kidneys</u> • Associated organs • Gross structure • Main functions • Microscopic structure <u>Structure & function of the following:</u> • Ureters • Urinary bladder • Urethra <u>Urine</u> • Formation	2-3	6	General Nursing Science Activities of daily living elimination Urinalysis	Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Chapter 8* Anatomy TV Urinary system Fluid, electrolyte, and acid base balance MOODLE Video Pre class Quiz

Theory Block 4 (week 27): 25 – 29 August Biological and Natural Sciences					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
	• Composition • Micturition <u>Effects of Ageing Homeostatic Imbalances</u> Define the following: • Acute kidney injury • Kidney stones • Diabetic neuropathy • Urinary tract infection • Urine incontinence				
Wednesday	<u>Acid - base Balance</u> Terminology • Acid / Acidosis • Base / Alkalosis • Hydrogen vs Bicarbonate <u>Acid – base homeostasis</u> • Role of the lungs • Role of the kidneys <u>Fluid and electrolyte imbalance</u> Terminology • Osmosis • Diffusion • Intracellular Fluid • Extracellular Fluid <u>Fluid movement</u> Between intracellular and extracellular compartment <u>Water regulation</u> • Intake and Output • ADH + Water reabsorption		1		Anatomy .TV MOODLE
	Self-directed learning Complete pre-class activity for SLO 1.9		1		
	1.9 Nervous System • Terminology • Location, structure, components + functions of the following: o Lymph o Meninges	2-3	5	GNS – Comprehensive Neurovascular Patient Assessment	Minett, P and Ginesi, L, 2023. Anatomy and Physiology: An introduction for nursing and healthcare. Chapter 9 p159 - 180 <u>Access to online resources:</u>

Theory Block 4 (week 27): 25 – 29 August Biological and Natural Sciences					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
	○ Cerebrospinal fluid ○ Ventricles • Brain ○ Structures with associated functions & functional areas • Spinal cord • Peripheral Nervous System Autonomic nervous system • Effects of ageing • Definitions of homeostatic imbalances				**Anatomy.TV** Human Anatomy and Physiology - Nervous system - Extensor reflex Human Anatomy and Physiology - Nervous system - Flexor reflex Human Anatomy and Physiology - Nervous system - Ageing **Moodle** Pre- and Post – Class Qui
Thursday	**1.10 Special Senses** Terminology Eye • Structures of the eye • Physiology of sight • Refraction • Pupil size • Accommodation • Involvement of the retina • Binocular vision • Extraocular muscles of the eye • Accessory organs of the eye Ear • Structure of the ear • Physiology of hearing • Physiology of balance Smell and taste • Structures of the tongue and nose • Physiology of taste and smell The effects of aging Definitions of homeostatic imbalances	2-3	2	GNS Nursing care of a patient is special circumstances	Minett, P and Ginesi, L, 2023. Anatomy and Physiology: An introduction for nursing and healthcare. Chapter 10 Access to online resources: **Anatomy.TV** Human Anatomy and Physiology - Special senses - Visual Processing Video Human Anatomy and Physiology - Special senses - Olfactory Transduction Video Human Anatomy and Physiology - Special senses - Gustatory Transduction Video Human Anatomy and Physiology - Special senses - Auditory transmission Video Human Anatomy and Physiology - Special senses - Auditory Transduction Video Human Anatomy and Physiology - Special senses - Effects of Ageing **Moodle** Pre- and Post – Class Quiz
	Self-directed learning Complete pre-class activity for SLO 1.11		1		
	1.11 Digestive System, Metabolism and Body Temperature Regulation • Terminology • Ingestion	2-3	4	GNS – Comprehensive Patient	Minett, P and Ginesi, L, 2023. Anatomy and Physiology: An introduction for

Theory Block 4 (week 27): 25 – 29 August Biological and Natural Sciences					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**

	• Deglutition
	• Propulsion
	• Mechanical digestion
	• Chemical digestion
	• Digestive enzymes
	• Metabolism
	• Motility
	• Absorption
	• Elimination
	• Anabolism
	• Catabolism
	• Metabolic rate
	• Overview of functions & examples of major and essential nutrients, vitamins & minerals
	• Structures of GIT
	  ○ List
	  ○ Location
	  ○ Macroscopic & microscopic structure (overview)
	  ○ Functions
	• Associated Organs
	• Structure (overview) and digestive function of the following:
	  ○ Liver
	  ○ Gall bladder
	  ○ Pancreas
				Assessment and Health Education	nursing and healthcare. Chapter 7 p121 - 137
					
					Access to online resources:
					
					Moodle
					
					Pre- and Post – Class Quiz

Friday	• Digestive Processes
	• Gastric Secretions
	  ○ List
	  ○ Regulation
	  ○ Secretion
	• Gastric Motility
	  ○ Regulation
	  ○ Emptying
	• Breakdown of:
	  ○ Proteins
	  ○ Fats
		2-3	4		Minett, P and Ginesi, L, 2023. Anatomy and Physiology: An introduction for nursing and healthcare. Chapter 7 p121 – 137
					
					Access to online resources:
					Anatomy.TV
					Human Anatomy and Physiology - Digestive system - Swallowing Video

Theory Block 4 (week 27): 25 – 29 August Biological and Natural Sciences					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
	○ Carbohydrates • Overview of enzymes involved and final product of digestion • Absorption of nutrients • Bacterial Flora • Role of large intestinal flora • Defecation reflex • Metabolic Rate ○ Influencing factors ○ Heat production + temperature regulation • Effects of aging • Definitions of homeostatic imbalances				Human Anatomy and Physiology - Digestive system - Chemical Digestion in the stomach Video Human Anatomy and Physiology - Digestive system - Defecation Video Human Anatomy and Physiology - Digestive system Ageing **Moodle** Pre- and Post – Class Quiz
	1.12 LYMPHATIC SYSTEM Lymph • Composition • Function Lymphatic vessels • Structure • Distribution Structure & function of: • Spleen • Thymus • Peyer's patches • MALT Effect of ageing Homeostatic imbalances Define: • Lymphedema • Lymphadenopathy	2-3	3	GNS - Comprehensive Patient Assessment	Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Page 97 - 102* Lymphatic System and Immunity Video Lymph nodes, lymphatic pump & lymphatic circulation Anatomy.TV Organs and tissues A&P POP Quiz Assessed by peers

Theory Block 4 (week 28): 1 – 5 September Biological and Natural Sciences + General Nursing Science					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
Monday	**Self-directed learning**		1		
	1.13 IMMUNE SYSTEM <u>Terminology</u> • Immunity • Innate immunity • Acquired immunity • Specific immunity • Non-specific immunity • Passive immunity • Active immunity • Inflammation • Phagocytosis <u>Non-specific defence mechanisms</u> • Epithelial barriers • Phagocytosis • Natural antimicrobial substances <u>Inflammatory response</u> • Causes • Acute inflammation • Pathophysiology related to signs & symptoms • Principal substances • Chronic inflammation • Immunological surveillance <u>Immunity</u> • Lymphocytes • Cell-mediated immunity • Antibody-mediated / humoral immunity • Acquired immunity • Active • Passive <u>Effects of aging</u> <u>Homeostatic imbalances</u> Define: • Hypersensitivity • Autoimmune disease • Immunodeficiency	2-3	5	GNS – Health Education Infection prevention	Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Chapter 14* Anatomy TV Lymphatic System and Immunity <u>MOODLE</u> Videos – inflammatory response Worksheet – Inflammatory response <u>MIND MAP</u> Immune system

Theory Block 4 (week 28): 1 – 5 September Biological and Natural Sciences + General Nursing Science					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
	Reflection 1 hour: Consider how knowledge about this system can impact you own health and that of the patient				
Tuesday	**Self-directed learning** Pre-class quiz 1.14		1		
	1.14 ENDOCRINE SYSTEM <u>Terminology</u> • Hormones • Glands • Inhibition • Stimulation • Positive & negative feedback (review homeostasis) <u>Hormone action (overview)</u> • Integrate with relevant body system • Anatomical location • Site of hormone secretion • Hormone secreted • Target organ/s effected and effect. <u>Endocrine glands (related to the above)</u> • Hypothalamus & pituitary glands • Relationship between them • Stimulation vs inhibition • Structure, Function, Target Organ Hormone of the following: , • Thyroid gland • Para-thyroid glands • Pancreas • Adrenal glands • Incl. short-term stress response (refer to SNS in the nervous system) + long-term stress response – endocrine vs nervous system response • RAAS • Urinary system & CVS effects <u>Effects of ageing</u> <u>Homeostatic imbalances</u> Define: • Gigantism • Dwarfism • Hypo vs hyperthyroidism		5	BNS Communication system e.g., blood GNS Blood glucose measuring	Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Chapter 11* Anatomy TV Endocrine system MOODLE Crossword completion – Terminology & homeostatic imbalances

Theory Block 4 (week 28): 1 – 5 September Biological and Natural Sciences + General Nursing Science					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
	• Diabetes mellitus • Addison's vs Cushing's disease				
	Reflection 1 hour: Consider how knowledge about this system can impact you own health and that of the patient				
Wednesday	**Self-directed learning** Pre-class quiz SLO 1.15		1		
	1.15 REPRODUCTIVE SYSTEM <u>Terminology</u> • Menstrual vs ovarian cycle • Puberty • Gonadotrophins • Spermatogenesis • Oogenesis • Menopause <u>Anatomy</u> • Male • Female <u>Puberty</u> • Male • Female <u>Physiological effects of hormones in the male & female</u> • Oestrogen • Progesterone • Testosterone • LHRH • FSH • LH <u>Effects of aging</u>	2	3	GNS Health Education Nursing Care of Patients with Reproductive Problems or surgeries.	Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing and healthcare. Cape Town: Juta. Chapter 12* Anatomy TV Reproductive System MIND MAP
	Self-directed learning **Complete post-class activity for SLO 1.15**		3		
Thursday	**Self-directed learning** **Pre-class quiz for SLO 1.16**		1		
	1.16 Introduction to Genetics <u>Terminology</u> • Chromosome vs gene • Haploid vs diploid • DNA vs RNA		2	GNS Health Education Nursing Care of Patients with special needs or disabilities.	Minett, P & Ginesi, L. 2020. *Anatomy and Physiology: an introduction for nursing*

Theory Block 4 (week 28): 1 – 5 September Biological and Natural Sciences + General Nursing Science					
Day	**Learning Outcomes**	**Blooms**	**Periods**	**Integration**	**Resources**
	• Dominant vs recessive • Homozygous vs heterozygous • Homologous • Autosomes vs sex chromosomes • Meiosis vs mitosis (refer to cells & tissues) <u>Autosomal inheritance</u> • Dominance • Co-Dominance <u>Sex – Linked Inheritance</u> • X-linked <u>Effects of Ageing Homeostatic Imbalances</u> <u>Definition:</u> • Genetic • Genetic phenylketonuria • Chromosomal • Down's Syndrome				*and healthcare. Cape Town: Juta. Chapter 13* Anatomy TV Development and inheritance
	Self-directed learning **Post-class quiz for SLO 1.16** **(2 opportunities)**		4		
Friday	**GNS – see module Guide**				

PART E: MODULE CONTENT EXPOSITION

SEMESTER 1

1. Introduction to anatomy and physiology

DEFINITION OF TERMS

- Anatomy is the study of the structure and shape of the body and its parts and their relationship to each other.
- Physiology is the study of how the body and its parts function.
- Biochemistry is the study of the chemistry of living organisms and the molecular basis for the changes occurring in living cells. In biochemistry, biological objects are studied from the physical point of view in the effort of an exact physical and chemical description of biological processes.
- Biophysics uses physical techniques and methods to study the functions, structures and energetics of biological objects.
- Developmental stages include the various stages of childhood and adulthood growth and development.

LANGUAGE OF ANATOMY

- Anatomical position (i.e. the body positioning regardless of the position the body happens to be in at that time). *Refer to the prescribed book for this description.*
- Body directions, surfaces, and body planes using proper anatomical terms
  - Directional terms explain where one body structure is in relation to another.
  - Regional terms refer to the various regions/areas of the body based on the correct anatomical names of the body surfaces. *If your friend has pain posterior to the knee, use anatomical language to describe the location of this pain.*
  - Body planes and sections: Median (mid-sagittal), Frontal (coronal), Transverse. *Refer to the pictures of these planes in your anatomy book.*
    - Sagittal section: separates the body on a longitudinal plane into right and left parts
    - Frontal (coronal) section: separates the body into anterior (front) and posterior (back) parts
    - Transverse (cross) section: separates the body on a horizontal plane into superior and inferior parts.
- Body cavities and organs within each cavity. Dorsal cavity includes the cranial cavity and the spinal cavity, whereas the ventral cavity contains all the structures/organs within the chest, the abdomen and pelvis

2. Orientation to the human body

- Levels of structural organisation
- Necessary life functions (to maintain life)
- Principles of Homeostasis

Levels of structural organisation

1. Name the six levels of structural organization that make up the human body.
2. Match the names of the organ system of the body in Column A to the functions described in Column B.

Column A	Column B
1) Integumentary system	A. Responds to internal and external stimuli by activating appropriate muscles and glands (effectors)
2) Endocrine system	B. Delivers nutrients to the blood for use by the body cells
3) Skeletal system	C. Waterproofs the body and protects the deeper tissues from injury
4) Digestive system	D. Helps to cleanse the blood and house white blood cells involved in immunity
5) Nervous system	E. Responsible for producing movement of the body by contracting or shortening.
6) Lymphatic system	F. Support the body organs and provides a framework to produce movement
	G. Releases chemicals into the blood to target organs
	H. Removes waste and helps to regulate blood pressure

Functions to maintain life

1. Briefly explain the following necessary life functions:
   a) Maintaining boundaries
   b) Movement
   c) Responsiveness
   d) Digestion
   e) Metabolism
   f) Excretion
   g) Reproduction
   h) Growth

2. List five survival needs of the human body and relate these to Maslow's Hierarchy of Needs.

3. Cells & tissues

Cells are the smallest unit of life. They are the structural unit of all living things.

At the end of this section, the student should be able to:

- Describe structure of the human cell
- Explain the functions of the cell and its parts
- Briefly describe cell growth and reproduction
- Describe the structure and function of the different types of human tissue
- Briefly discuss the covering and lining membranes of the human body
- Describe tissue repair and regeneration: the normal healing process

Structure of the human cell

All cells have the same basic parts and some common functions. The cell consists of three parts: the cell membrane, cytoplasm, and the nucleus. Within the cytoplasm there are organelles (fine fibres and hundreds or even thousands of small structures that perform specific cell functions).

1. Label the structures of the cell indicated in Figure 1.3.1.

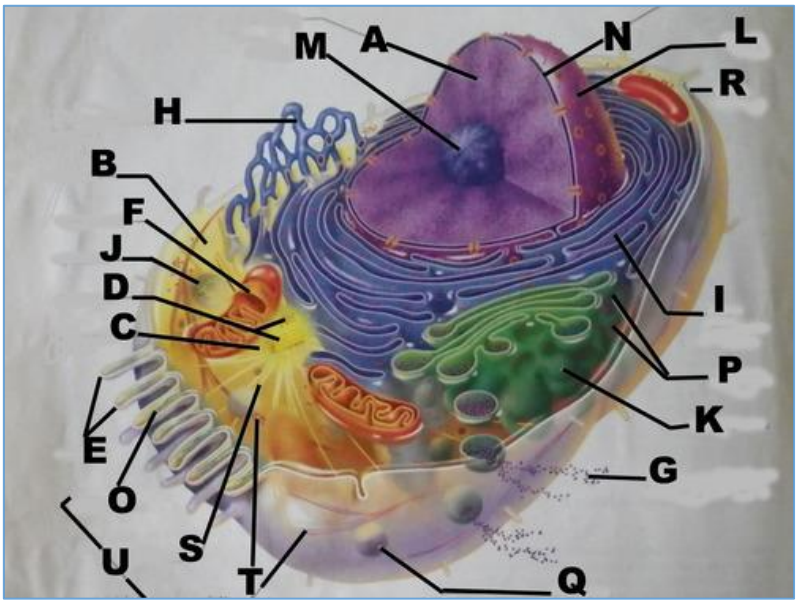


Figure 1.3.1. Structure of the generalized cell

Functions of the cell and its parts

1. Describe the structure and functions of mitochondria
2. Describe, tabular form, the structure and functions of ribosomes, endoplasmic reticulum (ER) and the Golgi apparatus.
3. Differentiate between peroxisomes and lysosomes.
4. Compare and contrast active and passive transport of substances across the plasma membrane

Cell growth and reproduction

1. Differentiate between mitosis and meiosis

Different types of human tissue: Structure & function

1. Draw a table to compare these four basic tissue types: epithelial tissues, connective tissue, muscle tissue, and nervous tissue. Give three examples of each

1. List the different classes of connective tissue, their functions, and locations

2. Compare between the structures and body locations of the three types of muscle tissue
3. Describe the characteristics general to nervous tissue
4. Compare cutaneous, mucous, and serous membranes according to structure and function

Covering and lining membranes

There are three types of covering and lining membranes. These are: cutaneous, mucous, and serous membranes. The cutaneous membrane is a covering membrane; the other two are lining membranes. The cutaneous membrane covers the body surface. The mucous membranes line body cavities that are open to the exterior. The serous membranes line body cavities that are closed to the exterior, i.e. they are found in closed body cavities. Serous membranes are named according to their location and specific organic associations.

1. Differentiate between cutaneous, mucous, and serous membranes
2. Name the membrane that lines the thoracic cavity and covers the lungs.
3. Explain the purpose of the serous fluid that is in between the two layers of serous membranes.

Tissue repair and regeneration: the normal healing process

Tissue repair involves inflammation, organization and regeneration.

1. Describe the process of tissue repair that is involved in normal healing of a superficial wound.
2. Identify the regenerative capacity of the different tissue types

3. Differentiate between inflammatory and immune responses.

4. Explain the tissue changes that occur with age.

4. Integumentary system

The integumentary system is formed by the skin and its appendages/derivatives: hair, nails, sweat and sebaceous glands. Your skin is an incredibly complex organ which covers your entire body and has a very big role to play. The skin is composed of two distinct layers: epidermis and dermis. The skin can automatically repair small cuts, tears and burns.

Knowledge of the integumentary system is important when caring not only for a patient with problems of the skin and associated structures but for any patient with health care needs, e.g. temperature regulation.

Structure & function of the skin

1. Describe the structure and function of the integumentary system (skin and its appendages)
2. Differentiate between the epidermis and dermis
3. In the clinical environment, select a patient to assess their skin and appendages in terms of: (a) The general hygiene of the skin, (b) Condition of the skin, (c) Sensation, (d) Skin perfusion, (e) Skin colour, (f) Condition of the hair, and (g) Condition of the nails
4. Explain how skin colour is determined.
5. Label the diagram of the skin in Figure 1.4.1.

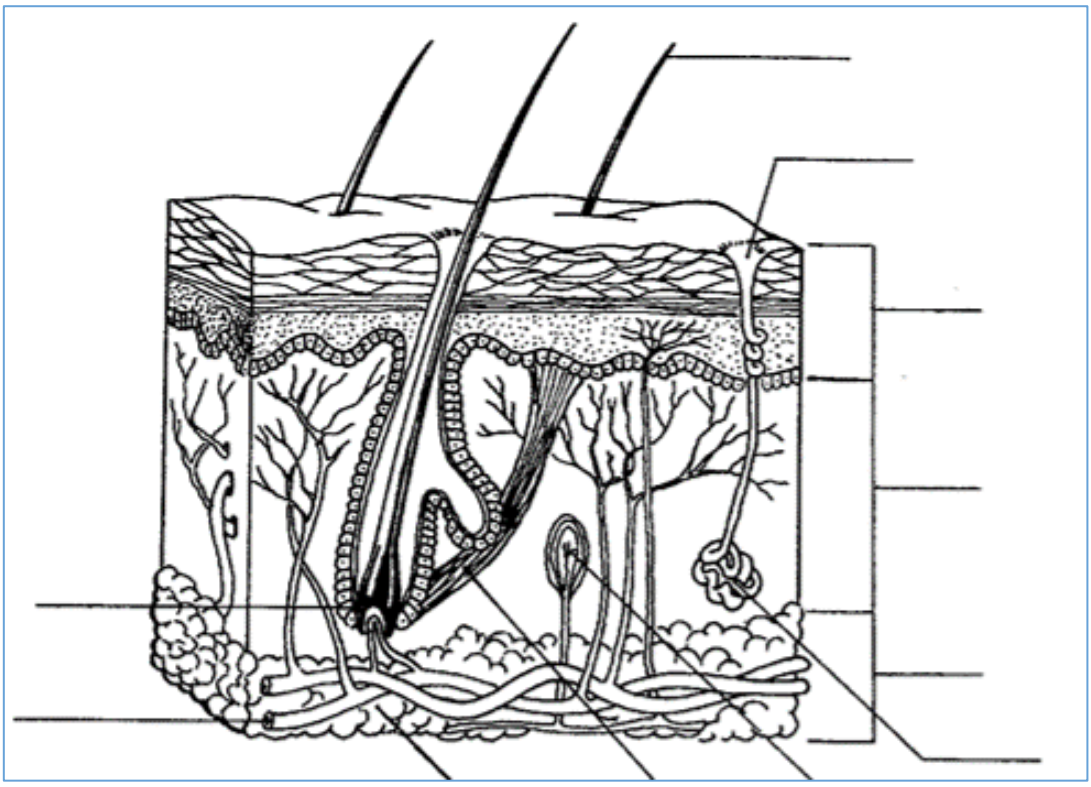


Figure 1.4.1: Diagram of the skin

6. Identify changes in the skin due to ageing and decide what the implications are of these changes for patients and for nursing practice.
7. In South Africa, we are exposed to large amounts of sunlight on a regular basis which predisposes us to developing skin cancer. Outline the education you would give your community in order to prevent skin cancer.

5. Cardiovascular system

This system is composed of blood vessels, blood and the heart. Blood vessels carry blood throughout your body. The heart is the pump which ensures the blood gets transported where it needs to go in the body. The blood vessels of the body form a closed delivery system that begins and ends in the heart. Knowledge and skills gains in this section will assist you in preventing cardiovascular diseases and also

promoting and maintaining safe nursing care for the patient with problems of the cardiovascular diseases

1. Describe the composition of blood with regards to:
    a) Plasma
    b) Blood cells and their structure

2. Describe the functions of the individual blood cells.

3. Compare and contrast the life cycle of erythrocytes and leukocytes.

4. Briefly explain the different blood groups and typing.

5. Describe the blood-clotting process after labelling the components: A- D in Figure 1.5.1.

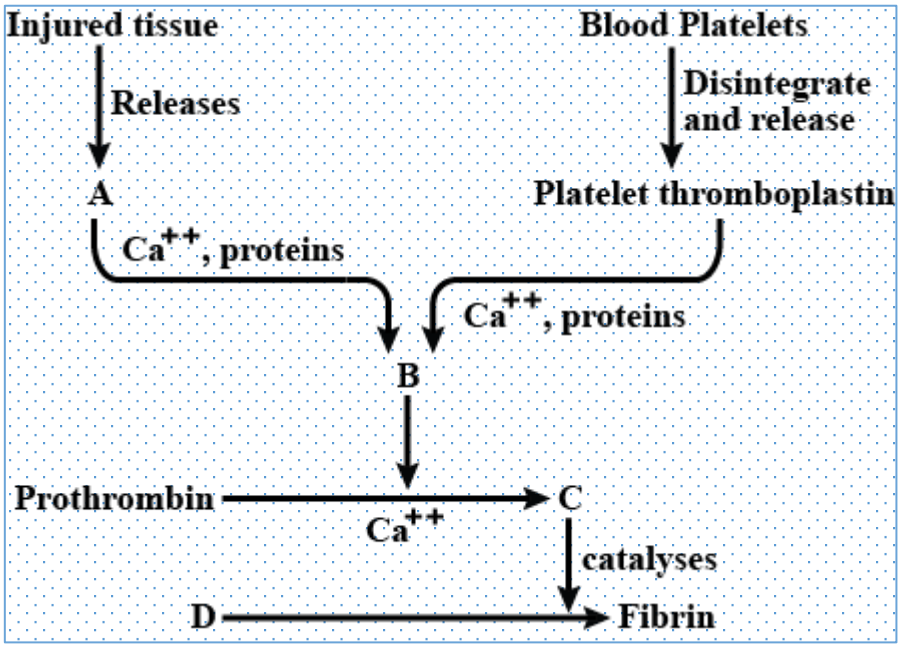


Figure 1.5.1. Blood-clotting process

3. Distinguish, in tabular form, between the different types of blood vessels
4. Discuss blood vessels under the following headings:
    a) Arterial system: structure and function
    b) Venous system: structure and function
    c) Tissue perfusion
    d) Vascular resistance
    e) Blood flow through capillaries: Hydrostatic & osmotic pressures
5. Differentiate between pulmonary and systemic blood circulation
6. Describe the heart with regards to:
    a) Size and location
    b) Structure and function
    c) Blood supply and venous drainage
    d) Blood flow through capillaries: Hydrostatic & osmotic pressures
    e) Blood flow through the heart: Pulmonary and systemic blood flow
    f) Coronary circulation
7. Describe the conduction system of the heart
8. Analyse a normal electrocardiogram (ECG)
9. Draw a flow chart showing the flow of blood from the right ventricle to the right atrium.
10. Describe blood pressure and pulse with regards to:
    a) Definition

b) Factors affecting blood pressure/pulse
c) Regulation of blood pressure/pulse
d) Pulse points

10. Analyse the abnormalities of an FBC laboratory test result and explain the implications for the patient based on the functions of the affected blood cells.
11. Explain the relationship between the cardiovascular system and other body systems.

6. Respiratory system

The respiratory system works in conjunction with the circulatory system to provide this oxygen. The respiratory system is responsible for the intake of oxygen and the excretion of carbon dioxide.

1. Label the structures in Figure 1.6.1.

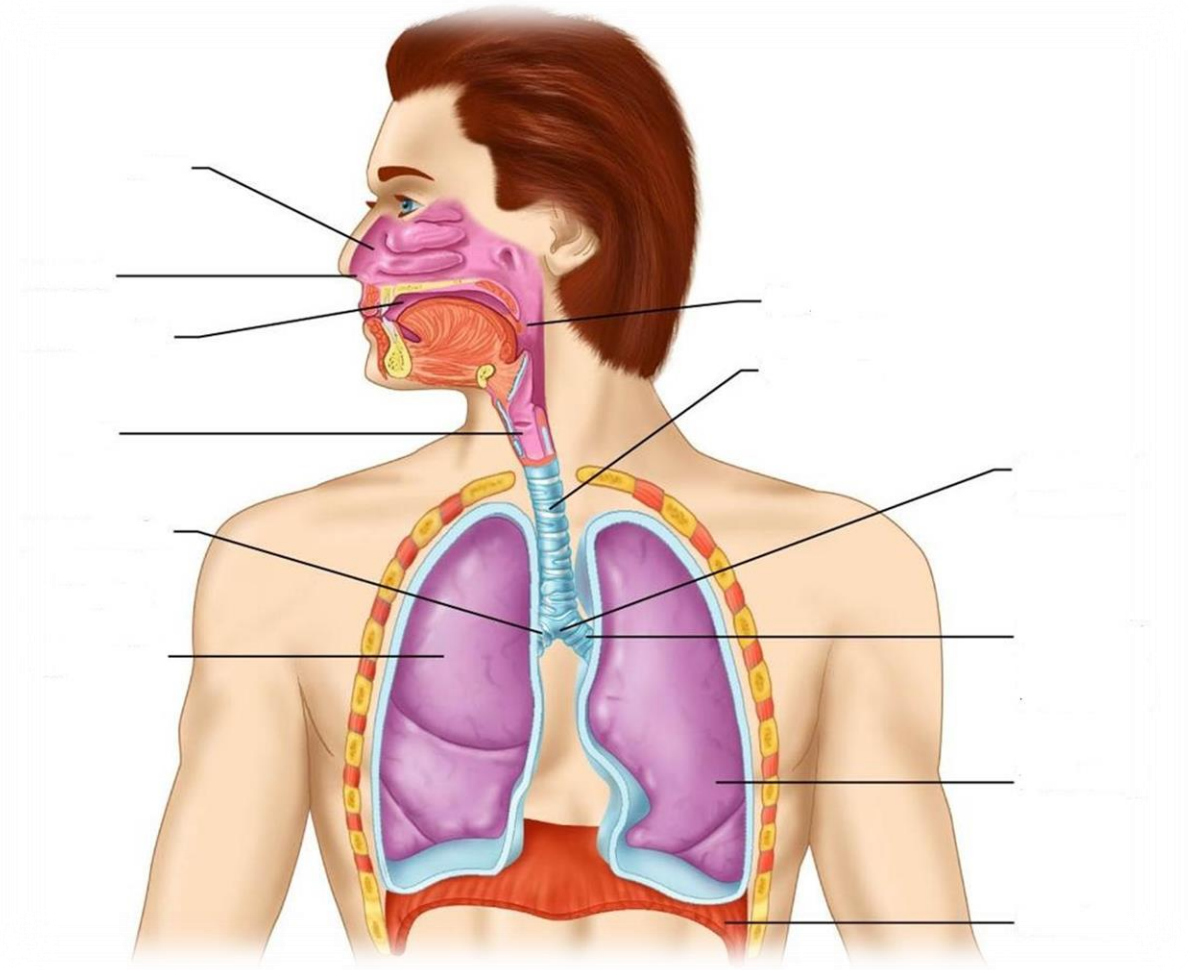


Figure 1.6.1. Respiratory System

2. In Table 1.6.1. below, describe the organs of the respiratory tract with regards to:
   a) Position
   b) Structure
   c) Function
   d) Blood supply

Table 1.6.1.

Organ	Position	Structure	Function
Pharynx			
Larynx			
Trachea			
Main (Primary) Bronchi			
Lungs			

3. Define the bronchial tree
4. Distinguish between conducting and respiratory zone structures
5. Explain how the respiratory muscles cause volume changes that lead to air flow into and out of the lungs (breathing).
6. Using a diagram, describe the process of gaseous exchange in the lungs and tissues.
7. Discuss the factors influencing breathing rate and depth.
8. Discuss the developmental aspects (overview) relating to the respiratory system.

7. Musculo-skeletal system

The musculo-skeletal system consists of muscles and bones. The skeleton is made up of bone (bone tissue), resilient cartilages, joints, and ligaments. The activity of the muscular system generates most body heat.

12. Differentiate between the axial skeleton and the appendicular skeleton
13. Classify bones and give an example of each type.
14. Label the diagram Figure 1.7.1.

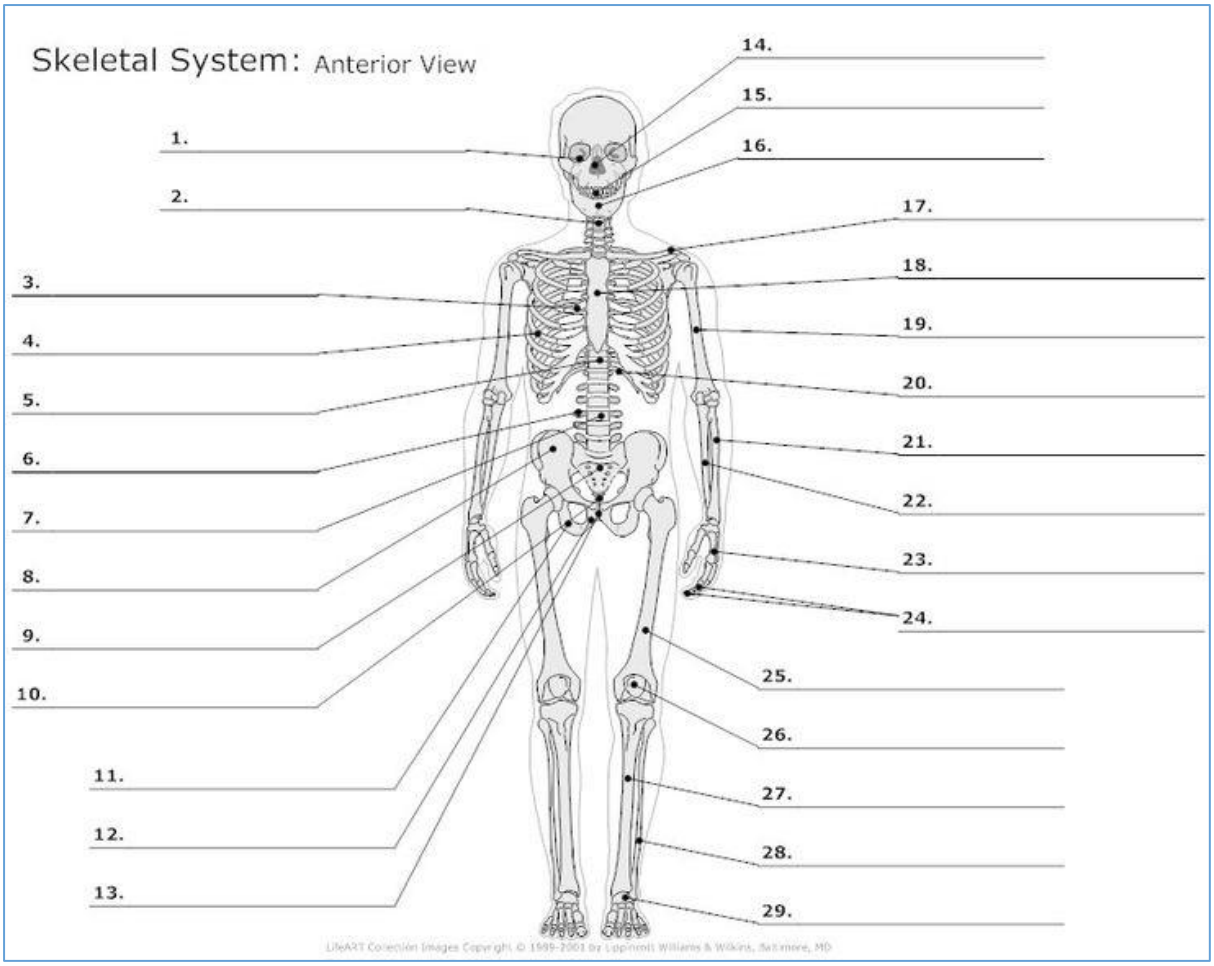


Figure 1.7.1.

15. Describe the following types of joints and give an example of each type.
    - Fibrous joints
    - Cartilaginous joints
    - Synovial joints
16. Describe the following:
    - Structure and function of skeletal muscle
    - Muscle contraction and relaxation
    - Developmental aspects (overview)
17. Label the muscles of the shoulder and back of the body on the diagram below (Figure 1.7.2.).

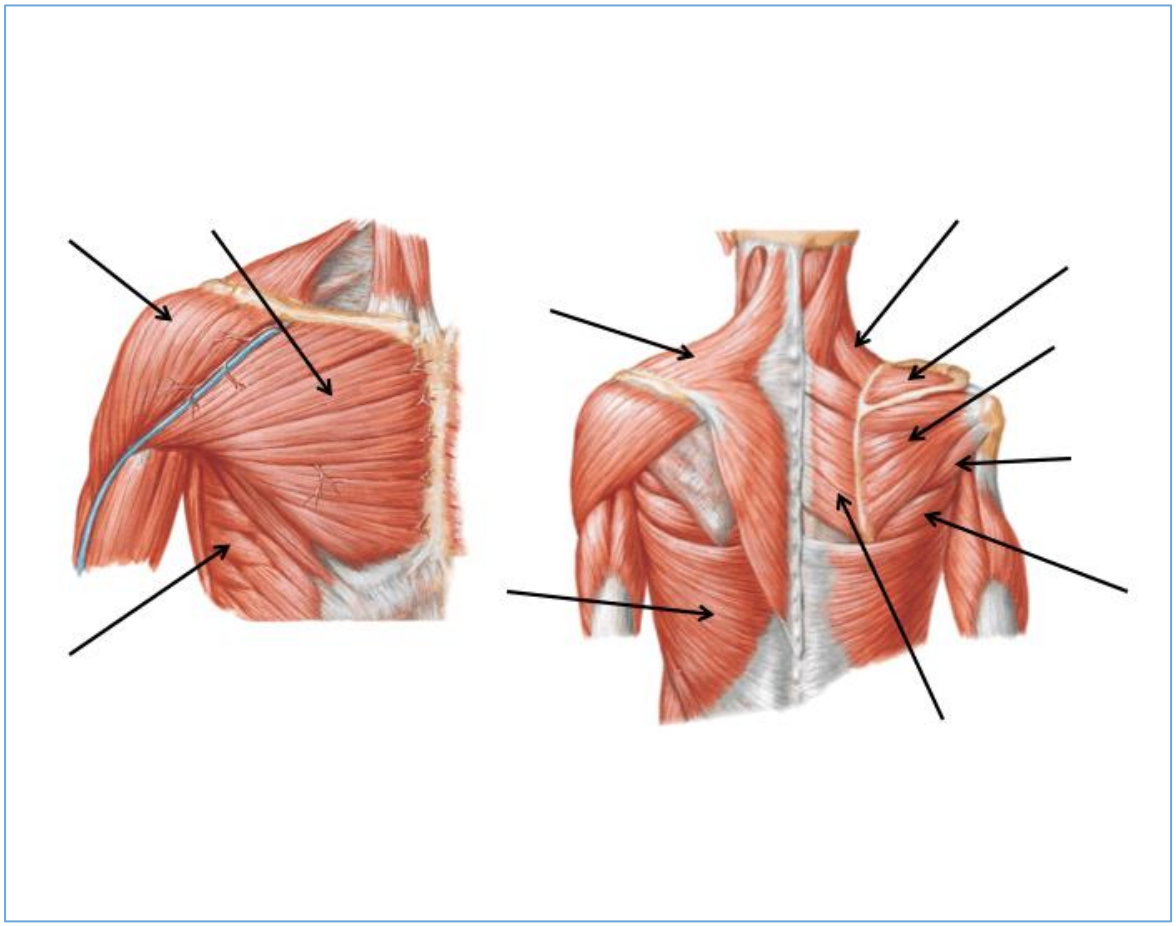


Figure 1.7.2: Muscles of the shoulder and back

8. Urinary system, fluid, electrolyte balance & acid base balance

The urinary system consists of kidneys, ureters, the urinary bladder and urethra. Kidneys filter at least 200 litres of fluids daily from our bloodstream by excreting toxins, excess ions and waste products while returning useful substances to the blood. The renal system can also adjust blood pH through the excretion of hydrogen ions (H+) and the conservation of bicarbonate, but this process takes hours to days to have an effect.

1. Label the structure in Figure 1.8.1.

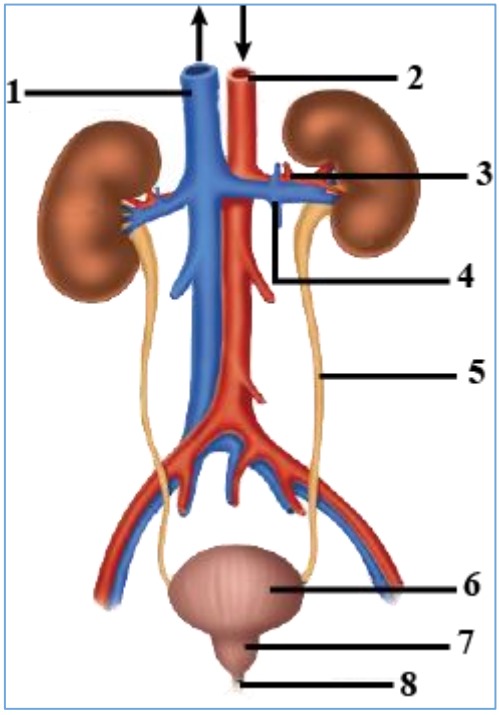


Figure 1.8.1: The urinary system

2. Describe the structure and function of the following structures:
   a) Ureters
   b) Bladder
   c) Urethra
3. Label the diagram of the kidney in Figure 1.8.2.

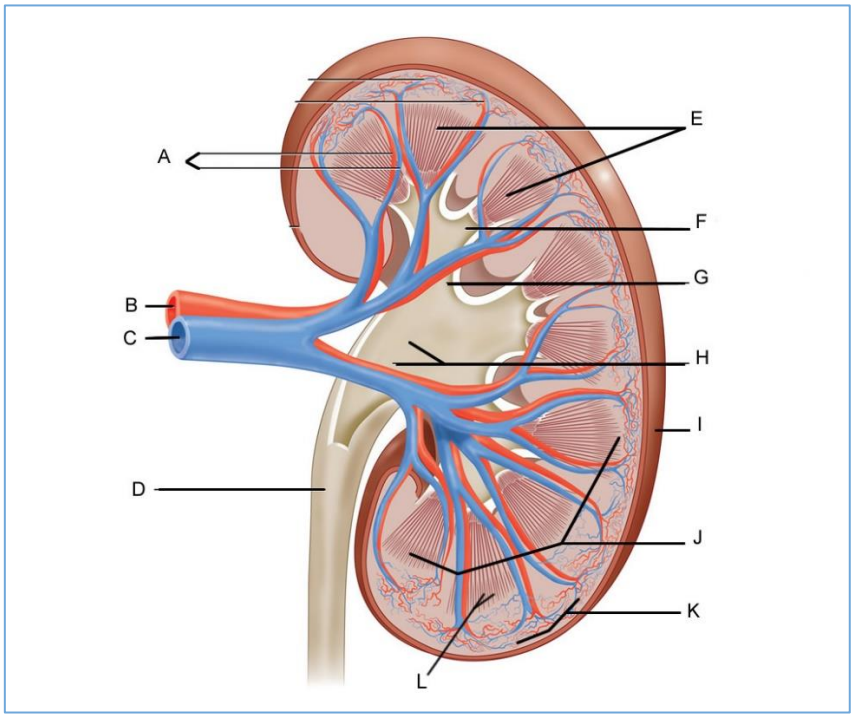


Figure 1.8.2: The kidney

4. Describe the nephron under the following headings:
   a) Structure and function of the nephron
   b) Formation of urine
5. Describe these functions of the kidney: respiratory, excretion and endocrine.
6. Discuss the developmental aspects of urinary system (overview)
7. Explain the development of bladder control in toddlers.
8. Describe the composition of body fluids
9. Explain how the neural and hormonal mechanisms regulate GFR in order to maintain systemic blood pressure.
10. Compare acids and bases.
11. Elaborate on acid-base balance including its regulation by the lungs and the kidneys.
12. Explain changes which occur in the urinary system with age.
13. Debate the interrelationship between the urinary system and other body systems.

SEMESTER 2

1. Nervous system

The nervous system is the main controlling, most highly developed and communicating system of the body. It receives information about the outside world and relays it to the organs, tissues and cells to enable them to adapt to the external events. It maintains a balance between body and the external environment.

The brain and spinal cord make up the central nervous system. The peripheral nervous system consists mostly of pairs of cranial nerves, spinal nerves and associated ganglia. The peripheral nervous system is subdivided into sensory (afferent) division and motor (efferent) division. Nervous tissue is made up of two types of cells: neuroglia (glial cells) and neurons. Neuroglia support and maintain neurons. Neurons are the structural units of the nervous system.

In situations of stress, anger or danger, the autonomic nervous system is stimulated (ANS). The ANS maintains a state of equilibrium by regulating the heart rate, respiration, bladder, certain endocrine glands, and organs of blood circulation.

1. List the basic functions of the nervous system
2. Differentiate between the sensory and motor divisions of the peripheral nervous system (PNS)
3. Identify which part of the motor PNS is responsible for the following:
   a) Stimulating the sweat glands
   b) Moving your hand when feeling intense heat from a hot pot
   c) Stimulating the secretion from glands of the digestive system
4. Neurons, like all cells, have a resting membrane potential. Define resting membrane potential and describe its electrochemical basis.
5. Briefly describe the structure & function of the spinal cord
6. Briefly describe the general structure of a peripheral nerve
7. Briefly discuss the repair and regeneration of nerve fibres

2. Special senses

The special senses include smell, taste, sight and hearing. Many factors affect taste. Our sense of taste depends on stimulation of our olfactory receptors by aromas. Temperature and the texture of food can enhance or even spoil its taste for us. The special sense organs are formed very early in embryonic development. The eyes are developed by the fourth week and all other special senses are functional at birth.

1. Name the layers of the wall of the eye and indicate the major function of each.
2. Explain how the functions of rods and cones differ.
3. Discuss the importance of the ophthalmoscopic examination.
4. Explain the importance of Vitamin A in vision
5. Explain the meaning of blind spot in relation to the eye.
6. Define the term: accommodation in relation to vision
7. Label the structures in Figure 2.2.1.

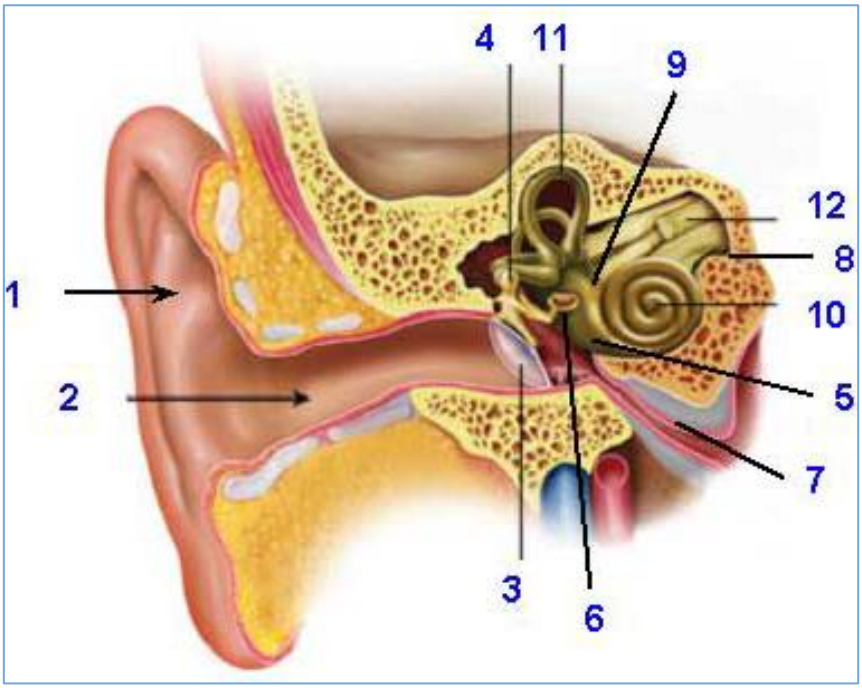


Figure 2.2.1: Anatomy of the ear

8. Explain the relationship of the ear and balance
9. Name the structures of the ear that transmit sound vibrations from the eardrum to the oval window.
10. Name the five basic taste sensations

3. Digestive system, metabolism & body temperature regulation

The gastro-intestinal (or digestive) system takes food in, breaks it down into nutrients, absorbs what is needed into the blood stream and eliminates the indigestible remains.

1. Label the organs in Figure 2.3.1 below.

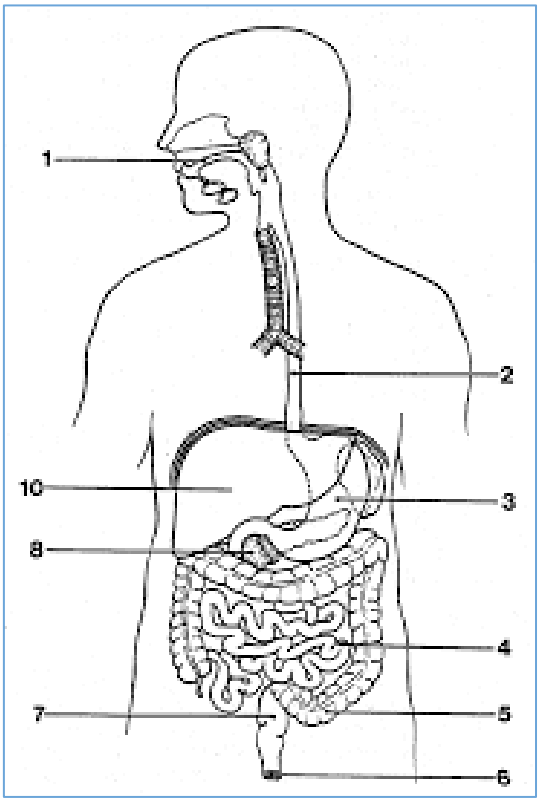


Figure 2.3.1. Digestive System

2. Describe the stomach and duodenum with regards to:
   a) Position
   b) Structure
   c) Blood supply and venous drainage
   d) Secretions
3. Briefly describe the physiology of digestion (mechanical & chemical).
4. Describe the structure and function of the liver, gall bladder and pancreas.
5. Describe these digestive processes and indicate the specific organ(s) involved in these processes:
   a) Ingestion
   b) Propulsion
   c) Mastication
   d) Absorption
   e) Defaecation
6. Discuss the developmental aspects of the digestive system (overview)
7. Describe major and essential nutrients (incl. vitamins and minerals)
8. Prepare a meal plan based on your dietary requirements and your calorie requirements
9. Special your own meal requirements based on your culture, individual preferences.

4. Lymphatic system

The lymphatic system is a network of organs and tissues working together with the immune and circulatory systems to filter pathogens from the blood, and regulate fluid balance. This system is involved in tissue drainage, absorption, and immunity. Lymph is transported from the lymph capillaries through the collecting vessels until it is finally returned to the venous system through the two large ducts in the thoracic cavity. The smooth muscle in the walls of the larger lymphatic vessels contracts rhythmically to help move the lymph along until it reach its destination.

1. Label the structures in Figure 2.4.1 below.

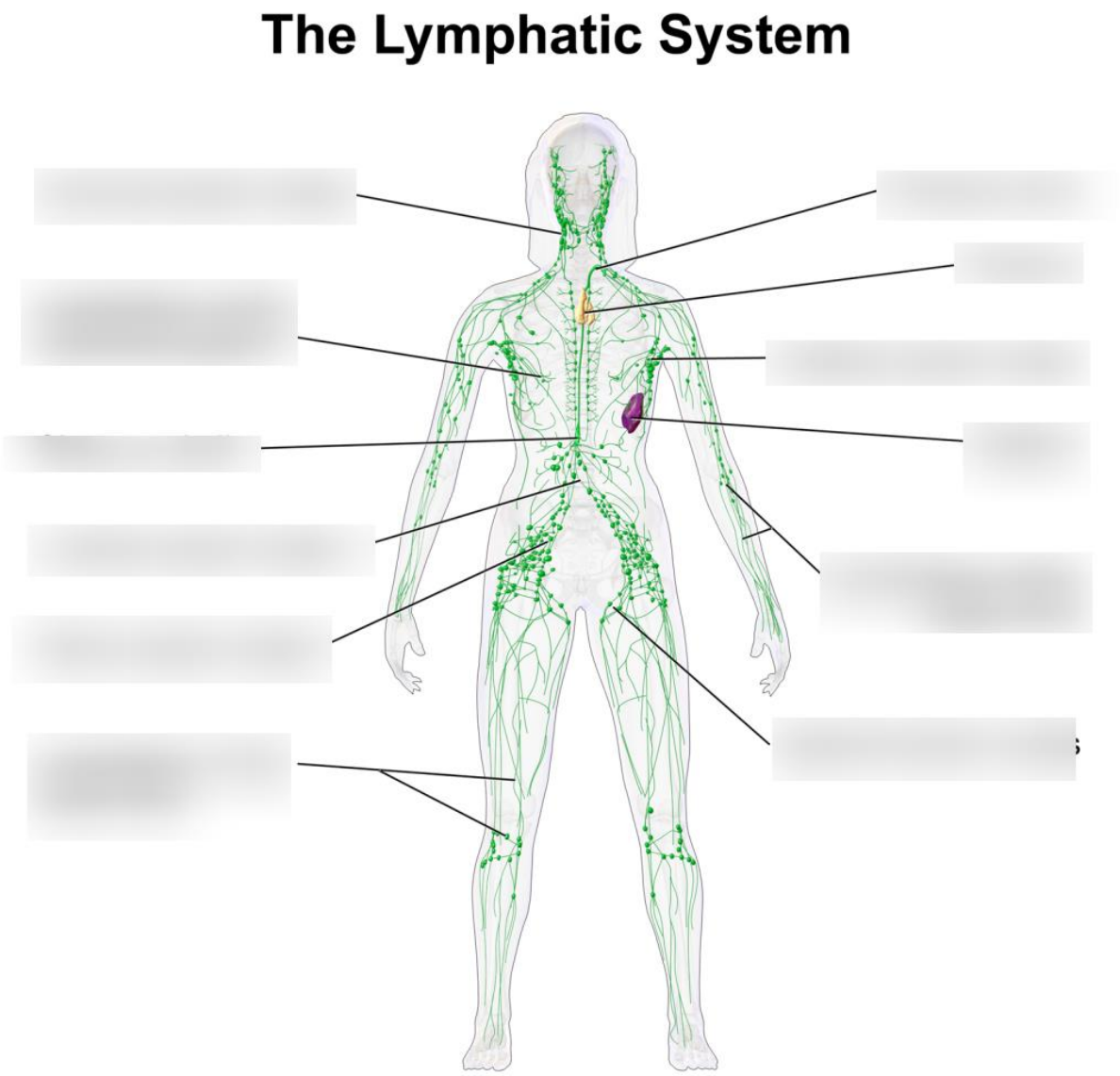


Figure 2.4.1: The Lymphatic System

2. Describe the functions of lymph nodes, tonsils, the thymus, Peyer's patches and the spleen.
3. There are fewer efferent lymphatic vessels that leave the lymph node than the afferent lymphatic vessels that feed it. Explain the reason for this anatomical characteristic.
4. Mrs X, 42 years old, has had a right radical mastectomy (removal of her right breast, right axillary lymph nodes and vessels. Her right arm is severely swollen and painful. Explain the reason for these signs and symptoms.
5. You have been advised to have flu vaccination each year. Explain why this is necessary.

5. Immune system

The immune system is a functional (not organic) system that is comprised of a variety of molecules and immune cells that inhabit the lymphoid tissues and organs and circulate in body fluids. The immune system protect the body through two types of mechanisms: innate defence mechanism and adaptive defence mechanism.

1. Describe the inflammatory response following a superficial injury to a finger.
2. Explain the importance of phagocytes following an invasion by bacteria that have gone through the mechanical/surface barriers.
3. Distinguish between humoral immunity and cellular immunity.
4. Explain why mild fever can be beneficial to the body.
5. Differentiate between an antigen and an antibody.
6. Explain why only people of compatible blood types can donate to one another.
7. Describe developmental aspects related to immunity justifying why some people are most susceptible to infections than others.

6. Endocrine system

The endocrine system, along with the nervous system, coordinates and directs the activity of the body's cells. It works slower than the nervous system by using chemical messengers (hormones) which are released into the blood to be transported throughout the body.

1. Explain how hormones bring about their effects in the target cells.
2. Describe the structure and function of the hypothalamus and the pituitary gland
3. Explain the relationship between the hypothalamus and the pituitary gland.
4. Define a tropic hormone and give examples of tropic hormones.
5. Explain why iodine is important for proper thyroid function.
6. Explain the relationship between the parathyroid hormone (PTH) and the skeletal system.
7. Describe how the thyroid and parathyroid are anatomically linked.
8. Name the hormone secreted by the pancreas and explain its function.
9. Describe the location, structure, and function of the adrenal glands.
10. Identify the group of hormones produced by the adrenal cortex that have anti-inflammatory effects and participate in the long-term stress response.
11. Explain how the blood glucose level is regulated by negative feedback involving pancreatic hormones.
12. Explain the role of female and male gonads in hormone production.

7. Reproductive system

Although male and female reproductive systems are quite different, their joint purpose is to produce offspring to ensure survival of the human species. The gonads in males are testes and in females, ovaries. The rising blood level of testosterone in the young male stimulates the adolescent growth spurt and prompts his reproductive organs to develop to their adult size, underlies their sex drive, and causes the male secondary characteristics to appear, e.g. deepening of the voice. In the female, her menstrual cycle begins at puberty and usually ends in her late forties or in her fifties (i.e. menopause).

1. Label the male reproductive system in Figure 2.7.1.

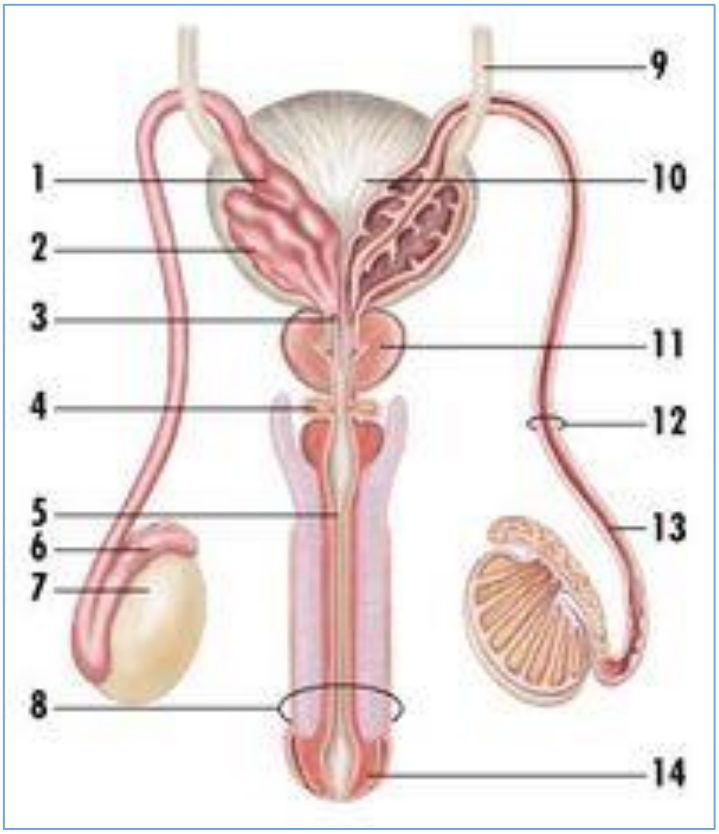


Figure 2.7.1: Male Reproductive System

2. Explain how might enlargement of the prostate gland lead to urinary system problems?
3. Explain the term: meiosis. What is the process meiosis called in females?
4. Identify the ovarian hormone that promotes the formation of female sex characteristics.
5. Describe the phases of the menstrual cycle including the physiological effects of oestrogen and progesterone.
6. You are to teach a group of teenage girls how to perform self-examination of their breasts. Outline the information you will share with them. Use relevant media to clarify your points.

8. Introduction to genetics

As indicated in the section on Cells and Tissues discussed in Semester 1, the nucleus controls every organelle within the cytoplasm. This includes processes of cell growth, repair and reproduction. The nucleus contains deoxyribonucleic acid (DNA) which carries the cell's genetic code and chromatin. Chromatin is the material needed to form chromosomes. Chromosomes are made up of connected strands of DNA known as genes. A gene is therefore part of the length of a DNA molecule. Chromosomes carry inherited information which will be carried over to daughter cells after parent cell division.

When a male sperm fuses with a female ovum they create a zygote, which is a single complete cell containing 46 chromosomes, i.e., 23 from each parent. The zygote further grows and divides to form an embryo. In reproduction, all cells grow to maturity and the majority then reproduce themselves.

1.16 INTRODUCTION TO GENETICS

TERMINOLOGY

- Chromosome vs gene
- Haploid vs diploid
- DNA vs RNA
- Dominant vs recessive
- Homozygous vs heterozygous
- Homologous
- Autosomes vs sex chromosomes
- Meiosis vs mitosis (refer to cells & tissues)

AUTOSOMAL INHERITANCE

- Dominance
- Co-Dominance

SEX-LINKED INHERITANCE

- X-linked

EFFECTS OF AGEING
HOMEOSTATIC IMBALANCES

Define:

- Genetic
- Genetic phenylketonuria
- Chromosomal
- Down's Syndrome