GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT
COURSE CURRICULUM

Course Title: Human Anatomy
(Code: 3320301)

Diploma Programmes in which this course is offered	**Semester in which offered**
Biomedical engineering	Second Semester

1. RATIONALE

Human Anatomy provides knowledge and underlying structural concepts of the different organs and systems of the human body. Students should gain familiarities with anatomical terms and their meaning, understanding of general anatomy of major systems, their importance in design of biomedical devices. The course also provides increased awareness of personal health.

2. COMPETENCY

The course content should be taught and implemented with the aim to develop different types of skills so that students are able to acquire following competency

Describe anatomical structure of the major systems and their organs in the human body.

3. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			**Total Credits (L+T+P)**	**Examination Scheme**				
				Theory Marks		**Practical Marks**		**Total Marks**
L	**T**	**P**	**C**	**ESE**	**PA**	**ESE**	**PA**	100
4	0	0	4	70	30	00	00	

Legends: L-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** - Practical; **C** – Credit **ESE** - End Semester Examination; **PA** - Progressive Assessment.

Note: It is the responsibility of the institute heads that marks for **PA of theory** & **ESE and PA of practical** for each student are entered online into the GTU Portal at the end of each semester within the dates specified by GTU.

4. DETAILED COURSE CONTENT

Unit	Major Learning Outcomes	Topics and Sub-topics
Unit – I **Anatomical planes, cell, tissues and blood**	1a.Define anatomical planes and its directional terms 1b.Explain structure of cell 1c.Differentiate between the various tissue types, particularly in terms of Structure. 1d. Explain blood composition 1e.Describe blood grouping systems	1.1Anatomy-Anatomical planes such as median, parasagittal, coronal, axial planes and anatomical directional terms like anterior,posterior,superior,inferior,proximal,distal,medial,lateral 1.2 Cell- Structure of cell including different organelles like cell membrane ,nucleus ,cytoplasm, endoplasmic reticulum, lysosomes, Golgi apparatus, mytochondria, ribosome 1.3 Tissues-Types of tissues such as epithelial, connective, nervous and muscle tissues 1.4 Composition of blood-including plasma-Properties of blood, plasma proteins, RBC-Structure and functions. WBC- Types, Platelets- Structure and life span. 1.5 Blood groups**:** ABO grouping system and RH grouping system , Determination of group.
Unit– II **Cardiovascular System**	2a.Elucidate anatomical structure of heart 2b.Describe the blood circulatory system	2.1 Anatomy-of heart-external features, structure 2.1.(i)Interior-of heart valves, blood vessels like arteries, arterioles, veins and venules 2.1(ii) circulatory system-major arteries and major veins
Unit– III **Respiratory, Digestive and Reproductive System**	3a.Draw organs of respiratory tract 3b.Draw organs of digestive tract 3c.Draw organs of Reproductive system	3.1 Introduction of respiratory tract-types of respiratory tract such as upper and lower with basic structural features of lungs, trachea, bronchi, alveoli 3.2 Introduction of digestive tract- including basic structural features of esophagus, stomach, small intestine, large intestine, liver, pancreas, gall bladder, 3.3Introduction of Male & Female reproductive system-Basic structural features of testis, ovaries, uterus, fallopian tube
Unit – IV **Skeletal and Muscular Systems**	4a.Identify individual bones of the skeleton and their main structural features 4b.Identify and describe the main types of joints and their movement in the body 4c.Classify muscles based on different criteria	4.1 Overview of human skeleton 4.2 Bones-structure and formation, types of bone such as long, short, irregular ,flat, sesamoid, structure of long bone 4.3 Joints-classification, types of synovial joints 4.4 Muscles-classification on the basis of striations, voluntary control and function
Unit – V **Excretory , integumentary System and Endocrine**	5a.Explain anatomical structure of excretory system 5b.Describe structural features of skin 5c.Enlist different endocrine glands 5e.Identify location of	5.1 Excretory system- structure of kidney including microscopic and macroscopic structure, urinary bladder, urethra. 5.2 Integumentary system-structure of skin 5.3 Endocrine System-different endocrine glands and their location.

Unit	Major Learning Outcomes	Topics and Sub-topics
System	different glands.	
Unit – VI **Nervous System**	6a.Describe the organization and identify major components of the nervous system 6b.Describe and identify the attributes of the central nervous systems	6.1Introduction to nervous system- CNS, PNS 6.2 Central nervous system- various parts of brain such as cerebrum, mid brain, medulla oblongata, cerebellum, spinal cord and internal structure of spinal tract. 6.3 Peripheral nervous system-sensory nerves and motor nerves
Unit – VII **Special Senses**	7a.Enlist special senses of human being. 7b.Elucidate structure of eye 7c.Explain structure of ear	7.1Introduction of special senses-hearing, sight, smell and taste 7.2Anatomy of Eye -including structure of sclera, cornea, choroid, ciliary body, iris ,lens ,retina ,optic nerve 7.3 Anatomy of Ear-structure of external, internal and middle ear

5. SUGGESTED SPECIFICATION TABLE WITH HOURS & MARKS (THEORY)

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A Level	Total Marks
I.	Anatomical planes ,cell ,tissues and blood	08	6	6	0	12
II.	Cardiovascular System	10	4	10	0	14
III.	Respiratory , Digestive and Reproductive System	08	4	4	0	08
IV.	Skeletal and Muscular Systems	06	4	2	0	06
V.	Excretory System, Integumentary and Endocrine System	08	4	4	0	08
VI.	Nervous System	10	6	6	0	12
VII.	Special Senses	06	4	6	0	10
	Total	**56**	**32**	**38**	**0**	**70**

Legends: R = Remember; U = Understand; A = Apply and above levels (Bloom's revised taxonomy)

Note: This specification table shall be treated as only general guideline for students and teachers. The actual distribution of marks in the question paper may vary from above table.

6. SUGGESTED LIST OF EXERCISES/PRACTICAL/EXPERIMENTS

Not applicable

7. SUGGESTED LIST OF STUDENT ACTIVITIES

7.1 Students may be given few exercises to prepare model and charts of different Systems.

7.2 Student may be asked to collect photographs from internet which is related to Anatomical structure of different systems.

7.3 Student may visit to one of the anatomical museum/medical college/hospital.

8. SUGGESTED LEARNING ACTIVITIES

A. List of Books

Sr. No.	Title of Book	Author	Publication
1.	Human anatomy and physiology made easy	Dr.Padma Sanghani	Akshat,2010
2.	Human anatomy and physiology	Ross and Wilson	Elsevier,2010
3.	Textbook of anatomy	Vishram singh	Elsevier,2008

B. List of Major Equipment/ Instrument

Different anatomical models like human skeleton, skin, respiratory system , human reproductive system, digestive system, circulatory system, human heart, human brain model , nervous system, heart lung model, muscular model, lymphocyte model, endocrine system, eye and ear model, etc…

C. List of Software/Learning Websites

http://www.gpgbiomedical.hpage.com

www.getbodysmart.com/

http://www.visiblebody.com/ (for 3D structure of different organs)

https://www.biodigitalhuman.com/home/

9. COURSE CURRICULUM DEVELOPMENT COMMITTEE

Faculty Members from Polytechnics

- **Prof. A.K.BULA**, Lecturer ,Dept. of Instrumentation Engg., G.P.Gandhinagar
- **Prof. M.H.DAVE**, Lecturer ,Dept. of Biomedical Engg., G.P.Gandhinaga**r**
- **Prof. S.S.MALKAN**, Lecturer, Dept. of Biomedical Engg., G.G.P.Ahmedabad
- **Prof. N.D.MAKWANA**, Lecturer, Dept. of Biomedical Engg., G.P.Gandhinagar

Co-ordinator and Faculty Members from NITTTR Bhopal

- **Dr. S. K. Gupta**, Professor and Coordinator for State of Gujarat.