Approved in 44th BoA Meeting (24-11-2021)

Course number : BE501
Course Name : Anatomy and Physiology
Credit Distribution : 3-0-0-3
Intended for : B. Tech – M.Tech Integrated Dual Degree Bioengineering students, M. Tech. Core for Integrated Dual Degree Bioengineering students with Specialization in Biomedical Bioengineering, Doctoral students, Elective for M.Tech Biotechnology or any other suitable M.Tech students.
Prerequisite : IC136 / BE 201/ BE 202 or equivalent /or course instructor approval
Mutual Exclusion : None

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1. Preamble:

This course is designed to impart a fundamental knowledge on the structure and functions of various organs of the human body. The overall anatomy and physiology of organ systems and their coordination are being dealt in this course. The purpose of learning this course on human anatomy and physiology is for biomedical engineering students to provide a basic understanding of the various parts of the human body, their anatomical position and their functions. Describes the structure and functions of various organs of the human body. Further, the mechanisms in the maintenance of normal functioning, homeostasis and disease perturbation knowledge will be gained.

2. Course Modules with quantitative lecture hours:

Module I: Foundations of Anatomy, Physiology and homeostasis [4 hours]

Organization of the Human Body, Chemical Foundations –Atoms, Ions, Molecules, Bonds, Solutions comprising different specialized tissues, organs and organ systems.

Module 2 : Haemopoietic system, Lymphatic System and Endocrine system: [8 hours]

Composition and functions of blood and its elements, their disorders, blood groups (ABO classification) and their significance, mechanism of coagulation, Anaemias and its types, lymph organs. Anatomy and physiology of Pituitary, thyroid, parathyroid, adrenal and pancreatic glands, specific hormones and disorders of these glands, endocrine control of growth and metabolism; pineal, thymus.

Module 3 : Cardiovascular and Musculo-skeletal system [10 hours]

Anatomy and physiology of the heart, cardiac cycle; circulation of blood, heart rate, blood pressure, ECG and heart sounds, lymphatic vessel, systemic and portal circulation; vascular system –arteries, arterioles, capillaries, venules. Blood pressure and its regulation. Brief outline of cardiovascular disorders like hypertension, myocardial infarction, congestive heart failure, cardiomyopathies and cardiac arrhythmias. Anatomy and physiology of muscular system, types of muscle tissue –skeletal, smooth, cardiac, contraction, muscle fibre regulation, Osseous system - structure, composition and functions of the skeleton, physiological properties of skeletal muscles and their disorders such as Rheumatoid arthritis, Gout etc.

Module 4: Digestive and renal System: [10 hours]

Gross anatomy of the gastro-intestinal tract, functions of its different parts, various gastrointestinal secretions and their role in the absorption and digestion of food, peptic ulcer, ulcerative colitis, hepatic disorder. the renal system structure –Anatomy and physiology kidney; structure of the glomerulus, nephron and network of blood capillaries urinary tract, formation of urine, concentration of urine; regulation of acid-base balance; the chemical acid-base buffer systems of body fluids and Micturition, diuretics and kidney disease.

Module 5: Respiratory system: [4 hours]

Anatomy of lungs, respiratory tract, mechanism and dynamics of respiration, lung volumes, transport of oxygen and carbon dioxide, disorders like cyanosis, Gas transport between the Lungs and tissues. Regulation of respiration. Respiratory adjustments in health and diseases.

Module 6: Nervous System [6 hours]

Anatomy and physiology of brain, blood-brain barrier, spinal cord, structure and types of the neuron, synapses neurotransmitters, organization of spinal and cranial nerves, central and peripheral nervous system, autonomic nervous system, receptors membrane potentials –graded potentials and action potentials, physiology of vision, audition, olfaction, taste and skin.

3. Text books:

1. Guyton, A.C. and Hall, J.E. "Textbook of Medical Physiology", 13th Edition, Saunders, 2015.
2. Ganong, W.F. "Review of Medical Physiology", 26thEdition (A Lange Medical book series) McGraw –Hill (International Ed.) 2010.

4. References:

1. Waugh, Anne and Allison Grant "Ross and Wilson Anatomy and Physiology in Health and Illness", 12thEdition, Churchill –Livingstone / Elsevier), 2014.
2. Carola, R., J.P. Harley and C.R. Noback. "Human Anatomy & Physiology", 2ndEdition, McGraw –Hill, 1992. 3.Vander, A.J., J.H. Sherman and D.S. Luciano "Human Physiology: The Mechanisms of Body Function", 5thEdition, McGraw –Hill, 1990
3. Khurana, Indu "A Textbook of Medical Physiology" 2nd edition Elsevier, 2015.
4. Johnson, L.R. "Essential Medical Physiology", 3rdEdition, Academic Press / Elsevier, 2003.

5. Similarity Content declaration with existing courses: NIL (0%)

S. No.	Course Code	Similarity Content	Approx. % of Content
1.			

6. Justification of new course proposal if cumulative similarity content is >30%:

Not applicable