Subject Description Form

Subject Code	ABCT2331
Subject Title	**Human Biology for Biomedical Engineering I**
Credit Value	3
Level	2
Prerequisite	Nil
Objectives	By completing this subject using an organ system-based approach in teaching and learning, students will be able to demonstrate a basic understanding of the anatomical structures, physiological, and pathological mechanisms related to the body operation.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a. Recall the basic anatomical structures of the selected organ systems; b. Understand the normal physiological mechanisms and control of the systems studied; c. Evaluate the quantitative nature of the selected organ systems; d. Explain the basic pathological basis involving the selected body systems; e. Collect and interpret the data derived from scientific experimentation to address physiological questions.
Contribution to Programme Outcomes (Refer to Part I Section 10)	▪ Programme Outcome 1: Demonstrate an ability to apply knowledge of mathematics, science, and engineering appropriate to the Biomedical Engineering (BME) discipline. (Teach) ▪ Programme Outcome 2: Demonstrate an ability to design and conduct BME experiments, as well as to analyse and interpret data. (Teach and Practice) ▪ Programme Outcome 4: Demonstrate an ability to identify, formulate, and solve BME problems. (Teach) ▪ Programme Outcome 5: Demonstrate an ability to understand the impact of BME solutions in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public. (Teach) ▪ Programme Outcome 11: Demonstrate an ability to communicate effectively and advise clients, professional colleagues and other members of the community. (Teach and Practice)

Subject Synopsis/ Indicative Syllabus	**Level of Body Organization from Cells to Systems:** Homeostasis and feedback control; primary tissues; and organization of organs and systems. **Nervous System:** Structure of the nervous system; basic structure of a typical neuron; generation, significance, and roles of resting membrane potential, grade potential, and action potential; receptors, synapses, and chemical transmission at nerve–nerve junctions; neurotransmitters; functions of the sensory and motor cortex; and pathogenesis and manifestations of common neurological disorders: vascular disorders, brain injuries, spinal cord injury, poliomyelitis, spina bifida, cerebral palsy, multiple sclerosis, and Parkinson's disease. **Respiratory System:** Structure of the respiratory system; ventilation and lung mechanics; exchange of gases in alveoli and tissues; transport of blood gases; mechanism of chemical control of ventilation rate; and basic quantitative evaluation. **Renal System:** Structure of the renal system; structure of a typical nephron; basic renal processes; regulation of sodium and water balance; regulation of potassium, calcium and hydrogen ions; and regulation of acid–base balance. **Digestive System:** Structures of the digestive system; digestion and absorption; and regulation of the digestive processes.
Teaching and Learning Methodology	**Lecture** will be used to explain and impart understanding of the factual material including basic anatomical structures and basic concepts and principles of physiology and pathology of the selected system. Mass lecturing with the aids of multimedia tools such as animations will be adopted to facilitate the conceptual learning of the students. **Tutorial** will be used to supplement lectures. Tutorial will include the use of interactive multimedia, online activities and case study to reinforce important concepts. Class activities involving problems in health professions will be designed to engage students' learning. **Laboratory Practical** will be used to introduce the scientific experimentation consisting of data collection and interpretation for addressing physiological questions.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)							
		a	b	c	d	e			
Continuous assessment	50%	√	√	√	√	√			
Examination	50%	√	√	√	√	√			
Total	100%								

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Continuous Assessment

In-class quizzes will be used to assess the intended learning outcomes (a) to (d). The continuous assessment will also consist of practical laboratory reports which will assess the intended learning outcome (e).

Examination

The examination will consist of multiple choice and short questions. The questions will be designed to assess the intended learning outcomes (a) to (e).

Student Study Effort Required

Class contact:	
▪ Lecture	22 Hrs.
▪ Tutorial	13 Hrs.
▪ Laboratory	4 Hrs.
Other student study effort:	
▪ Independent study and online activities	40 Hrs.
▪ Preparation for assessment and assignments	47 Hrs.
Total student study effort	126 Hrs.

Reading List and References

Textbook

- Human Form, Human Function: Essentials of Anatomy & Physiology (2011) 1st Ed. McConnell T & Hull K. Publisher: Lippincott Williams & Wilkins.
- Pathophysiology for the Health Professions (2014) 5th Edition. Gould B. E. & Dyer R. M. Publisher: Elsevier.

	Suggested Reference Books ▪ Human Physiology (2015) 14th Ed. Fox SI. Publisher: McGraw Hill. ▪ Basic Pathology: An Introduction to the Mechanisms of Disease (2009) 4th Ed. Sunil R. Lakhani, *et al*. Publisher: London: Hodder Arnold. ▪ Seeley's Anatomy and Physiology (2010) 9th Ed. Vanputte C, Regan J & Russo A. Publisher: McGraw Hill. ▪ Vander's Human Physiology: The Mechanisms of Body Function (2010) 12th Ed. Widmaier EP, Raff H & Strang KT. Publisher: McGraw Hill. ▪ Fundamentals of Physiology: A Human Perspective (2011) 4th Ed. Sherwood L. Publisher: Brooks Cole. ▪ Human Physiology: From Cells to Systems (2008) 7th Ed. Sherwood L. Publisher: Brooks Cole. ▪ Human Physiology: An Integrated Approach (2009) 5th Ed. Silverthorn DU. Publisher: Benjamin Cummings. ▪ Fundamentals of Anatomy & Physiology (2008) 8th Ed. Martini FH & Nath JL. Publisher: Benjamin Cummings. ▪ Laboratory Manual for Anatomy and Physiology (2009) 3rd Ed. Allen C & Harper V. Publisher: Wiley.
Date of Last Major Revision	14 July 2014
Date of Last Minor Revision	