UNITED STATES INTERNATIONAL UNIVERSITY

2.12.1 PHY 2336: NERVOUS SYSTEM PHYSIOLOGY

Pre-requisites: HAN 1321; PHY 1331; BCM 1341
Credit Units: 4.5

2.12.2 Purpose of the course;

This course is a combination of cellular neurophysiology and receptor physiology. It is designed to provide students with a deeper understanding of organization and functions of the nervous system; electrical and chemical signaling in the nervous system; and molecular and cellular aspects of receptor mechanisms, signaling pathways, effector systems, and chemotherapeutic approaches.

2.12.3 Expected Learning Outcomes of the Course;

At the end of the course, the student should be able to:

1. Describe the structural and functional divisions of the motor and sensory nervous system; central nervous system; and brain;
2. Identify and distinguish between tissues in the nervous system;
3. Explain chemical and electrical signaling in the nervous system;
4. Explain complex brain functions;
5. Explain the basic neuroanatomy and neurophysiology of acquired and inherited disorders;
6. Describe Drug-Receptor interactions and the mechanisms of receptor-mediated effects on neural excitability;
7. Explain the principles of action of chemotherapeutic agents.

2.12.4 Course Content

Neurophysiology

Introduction: Organization and function of the spinal cord and brain (CNS). **Sensory physiology**: Transmission of sensory signals. Excitable tissues & basics of electrical communications; neurons, synapses and small neural networks. Role in Homeostasis. **Membrane potential:** pumps, leaks, and the equivalent electrical circuit of the membrane. **Action potentials**: Ionic mechanisms of action potentials. Na channels, microscopic and macroscopic Na currents. Properties of **voltage-dependent Na and K channels**. Diversity of Na and K channels, and single-channel and macroscopic recording techniques. **Propagation of action potentials:** time constant and space constant. **Higher cerebral functions**: the Spinal Cord; Higher Functions of the CNS; Human learning; Memory and Forgetting; Sleep & Dreams. **Cellular Receptors. Practicals**. Demonstration of reflexes, hearing and visual acuity, activities of cranial nerves.

2.12.5 Mode of Delivery;

Lectures, power point presentations, and class discussions. These will take a participatory approach. **Laboratory learning and Experiments:** The lecturer, together with the laboratory technical staff, will take the students through practical sessions, beginning with **demonstrations**. The students will

thereafter be expected to use pre formulated laboratory manuals to carry out various practical exercises then write out their findings in their laboratory workbooks. **Video demonstrations and/or CD-Roms** on Medical Physiology when available, after the relevant topic has been covered. **Assignment criteria:** Students will be given several individual or group research assignments on topics relevant to the course. These could include lectures, discovery learning, problem-based learning, experimental learning, group-based learning, independent studies and e-learning.

2.12.6 Instructional Materials and/or Equipment;

Lecture notes or power points for presentation; Tutorials; Video demonstrations; CD-Roms; Dissection kits; Microscopes; Text books; Practical Manuals, Physiological solutions and organ baths; glassware; physiological equipment; physiological charts.

2.12.7 Course Assessment;

Distribution of Marks

Continuous Assessment Tests /Quizzes (atleast 2 sit in)		20%
Oral examination/Term paper	10%	
Mid-Quarter Exam	20%	
Final Exam	25%	
Continuous Laboratory exercises	15%	
End semester Practical Exam	10%	
Total	**100%**	

Grading

90 - 100	A
87 - 89	A^-
84 - 86	B^+
80 - 83	B
77 - 79	B^-
74 - 76	C^+
70 - 73	C
67 - 69	C^-
64 - 66	D+
62 - 63	D
60 - 61	D-
00 - 59	F