Semester:	8				
Course Code:	ME5170				
Course Name:	Biomedical Instrumentation II				
Credits Value:	3 (Notional hours: 150)				
Pre-requisites:	ME5014				
Core/ Optional:	Optional				
Hourly Breakdown	Lectures (hours)	Tutorials (hours)	Practical classes (hours)	Assignments (hours)	Independent Learning & Assessment (hours)
	38	4	2	4	102

Course Aim: This course is aimed at enhancing skills on how engineering principles can be applied to the design of biomedical instrumentation that involves with respiratory measurements, therapeutic and prosthetic devices, bio-potential amplifiers, biochemical sensors, and other clinical instrumentation.

Intended Learning Outcomes:
At the end of this course, students should be able to;

- **model** and **measure** the respiratory system,
- **evaluate** therapeutic and prosthetic devices,
- **apply** principles and operation of biopotential electrodes for ECG measurement,
- **evaluate** performance of chemical biosensors,
- **describe** clinical laboratory instrumentation

Course Content:

- **Introduction**
- **Measurements of the respiratory system**: Modeling the respiratory system, measurement of pressure and gas-flow, lung volume, respiratory plethysmography, some tests of respiratory mechanics, measurement of gas concentration
- **Therapeutic and Prosthetic Devices:** Cardiac pacemakers and other electric stimulators, defibrillators and cardioverters, mechanical cardiovascular orthotic and prosthetic devices, hemodialysis, lithotripsy, ventilators, infant incubators, drug delivery devices, surgical instruments, therapeutic applications of the laser
- **Biopotential Electrodes and Amplifiers:** Electrode–electrolyte interface, polarization, the electrode–skin interface and motion artifact, body-surface recording electrodes, internal electrodes, electrocardiograph, problems frequently encountered, transient protection, common-

mode and other interference-reduction circuits, cardiac monitors

- **Chemical Biosensors:** Blood-gas and acid–base physiology, electrochemical sensors, non-invasive blood-gas monitoring, blood-glucose sensors
- **Clinical laboratory instrumentation:** Spectrophotometry, automated chemical analyzers, chromatology, electrophoresis, hematology

Teaching/ Learning Methods:
Classroom lectures, tutorials, in-class exercises and assignments

Assessment Strategy:

Continuous Assessment 50%		**Final Assessment** 50%		
Details:		Theory (%)	Practical (%)	Other (%) (Project)
Labs (1)	10%	50%		
Tutorials/assignments/quizzes	20%			
Mini project	20%			

Recommended Reading:

- Webster, J. G. (Ed.). (2009). *Medical instrumentation: application and design*. John Wiley & Sons.
- Webb, A. G. (2018). *Principles of biomedical instrumentation*. Cambridge University Press.
- Tagawa, T., Tamura, T., & Oberg, P. A. (2019). *Biomedical sensors and instruments*. CRC press.

Note: Mini project will be done utilizing self-learning hours.