DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COURSE SYLLABUS

EE 471: Biomedical Instrumentation

COURSE TITLE	*CODE & NUMBER*	*SUBJECT AREA*	Contact Hours			Credit Units
			Th.	*Pr.*	*Tr.*	
Biomedical Instrumentation	**EE471**	Engineering	2	3	0	3
Pre-requisites:	EE312, EE370					
Course Role in Curriculum *(Required/Elective):*	Required course					
Catalogue Description: Electrical safety and precautions required in medical applications. Electrocardiography (ECG), analog and digital processing of ECG signals. Measurement of blood pressure, heart sound, flow and volume of blood. Statistical analysis of heart rate and blood pressure measurements. Basic respiratory system measurements. Principles of clinical lab instrumentation. Term project.						

***Textbooks*:** *(Author, Title, Pub., year)*
J.G. Webster (ed.), Medical Instrumentation: Application and Design, 4th ed., John Wiley & Sons, 2010.
Anders Brahme, Comprehensive Biomedical Physics, Elsevier Science & Technology Books, 2014
Gillian McMahon, Analytical Instrumentation, John Wiley & Sons, 2007

***Supplemental Materials*:** Slides, notes, and problem sets

***Course Learning Outcomes*:**

By the completion of the course the students should be able to:

1. Apply electronic design concepts in biosignal amplification problems.
2. Apply analog filter design methods in biosignal filtering problems.
3. Analyze building blocks of example biosignal acquisition device.
4. Apply engineering concepts in biomedical monitoring devices.
5. Apply engineering concepts in biomedical therapeutic devices.
6. Comprehend the design criteria for clinical analytical instrumentation.

***Topics to be Covered*:**	***Duration in Weeks***
1. Biopotential amplifiers and filters	2.5
2. Electrocardiography	2
3. Cardiovascular monitoring	2
4. Respiratory monitoring and oximetry	1
5. Defibrillators, High-frequency surgery	1.5
6. Mechanical Ventilation, Anaesthetic Machine	1.5

7.	Hemodialysis	1.5
8.	Clinical analytical instrumentation	1
9.	Term projects and their presentations	1

Key Student Outcomes addressed by the course: (Put a ✓ sign)

(1)	An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	✓
(2)	An ability to apply the engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	✓
(3)	An ability to communicate effectively with a range of audiences	
(4)	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	
(5)	An ability to function effectively on a team whose members together provide leadership, creates a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	✓
(6)	An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	✓
(7)	An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

Instructor or course coordinator: Dr. Bandar Hakim
Last updated: Spring 2020