DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING COURSE SYLLABUS

	ENGLISH ARABIC		CREDITS			
COURSE IIILE	CODE/NO	CODE/NO.	Th.	Pr.	Tr.	Total
Special Topics in Biomedical	EE 497	هـ ك 497	3	1	0	3
Engineering: Medical Device Design						
Pre-requisites:	EE 370					
Course Role in Curriculum	Required or Elective:		Elective			
	A pre-requisite for:					

Catalogue Description:

Selected topic to develop the skills and knowledge in the field of biomedical engineering.

In this version of the course, the focus will be on the design of medical devices starting from basic design principles, study of example medical devices to learn their design principles and practical components, study of the infection problems encountered in medical devices and how effective sterilization can be performed, and learning the basic human factors engineering principles as applied to medical device design.

Textbooks:

- 1. Rüdiger Kramme, Klaus-Peter Hoffmann, Robert S. Pozos (Eds.), *Springer Handbook of Medical Technology*, Springer-Verlag, Berlin, 2011. (ISBN: 978-3-540-74657-7)
- 2. Allen R. Nissenson and Richard N. Fine (Eds.), *Handbook of Dialysis Therapy*, 4th ed., Saunders Elsevier, Philadelphia, 2008. (ISBN: 978-1-4160-4197-9)
- 3. Iain McKenzi, Core Topics in Mechanical Ventilation, Cambridge University Press, Cambridge, 2008. (ISBN: 978-0521867818)
- John F. Butterworth IV, David C. Mackey and John D. Wasnick, *Morgan & Mikhail's Clinical Anesthesiology*, 5th Ed., McGraw-Hill Education, New York, 2013. (ISBN: 978-0-07-171405-1)
- 5. ANSI/AAMI HE75:2009, Human Factors Engineering Design of Medical Devices, 2009.

<u>Supplemental Materials:</u>

- References:
 - o Fresenius 2008H Hemodialysis System Technical Reference Manual.
 - Datex-Ohmeda Aespire 7900 Anesthesia Machine Technical Reference Manual.
- Web Resources:
 - Course web site (on instructor's website).
 - Video Lectures on instructor's web site and YouTube Channel.

Course Learning Outcomes:

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

- 1. Identify the design concepts behind medical devices.
- 2. Appreciate the multidisciplinary nature of medical device design.
- 3. Search for tools that enable solving design problems.
- 4. Learn the theoretical and practical aspects of hemodialysis machines and identify its basic design components.
- 5. Learn the theoretical and practical aspects of mechanical ventilator machines and identify its basic design components.
- 6. Learn the theoretical and practical aspects of anesthesia machines and identify its basic design components.
- 7. Learn the theoretical and practical aspects of infection control and sterilization measures in medical device design and operation.
- 8. Learn the basic principles of human factors engineering as applied to medical device design with examples.

	Topics to be Covered:	<u>Duration</u> in Weeks
1.	Introduction to basic concepts in medical device design	<u>2</u>
2.	Design principles of hemodialysis machines	3
3.	Design principles of mechanical ventilators	2
4.	Design principles of Anesthesia Machine	2
5.	Hygiene in medical technology	2
6.	Human factors engineering in medical device design	3

<u>Student Outcomes addressed by the course</u>: (Put a $\sqrt{\text{sign}}$)

(a)	an ability to apply knowledge of mathematics, science, and engineering	\checkmark
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic	\checkmark
	constraints such as economic, environmental, social, political, ethical, health and safety,	
	manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	\checkmark
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a	\checkmark
	global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for	\checkmark
	engineering practice.	

Key Student Outcomes assessed in the course: (a), (c), (h) and (k)

Instructor or course coordinator: Yasser Mostafa Kadah Professor, BME Program. Email: ykadah@kau.edu.sa Office: Bldg#40, Rm24G05. Office hours: TBD.

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Evaluation Criteria	
Class Homeworks	20%
Written Major Exams	30%
Mini-Projects	30%
Final Exam	20%

Last updated: January 2016