

**BME462/463 ELE562/563 Biomedical Instrumentation** 3+1 credits MWF11 K216 S2010

Ying Sun, Ph.D., Professor

Office: Kelley 206

Department of Electrical, Computer and Biomedical Engineering

Tel: 401-874-2515

University of Rhode Island, 4 East Alumni Avenue, Kingston, RI 02881

E-mail: sun@ele.uri.edu

week	date	lecture topics	Reference
1	1/25 1/27 1/29	introduction: medical instrumentation, biomedical signal processing introduction to PHENOM: Personal HEart fuNctiOn Monitor hardware and software of PHENOM	Chap. 1 handout
2	2/1 2/3 2/5	analog circuit design with operational amplifiers instrumentation amplifiers electrocardiogram (ECG): physiology	Chap. 3 Chap. 4
3	2/8 2/10 2/12	electrocardiogram (ECG): instrumentation noninvasive measurement of arterial oxygen saturation pulse oximetry	handout handout
4	2/15 2/17 2/19	no class (President's Day) instrumentation for photoplethysmogram ( <b>Phase 1 Report due</b> ) noninvasive measurement of arterial oxygen saturation	handout Chap. 14
5	2/22 2/24 2/26	electrical safety: current levels for various electrical hazards electrical safety: ground loop, patient isolation, noise rejection <b>Exam #1</b>	Chap. 2
6	3/1 3/3 3/5	electromyogram (EMG), electroencephalogram (EEG); electrodes amplifiers for biopotentials: design and applications review of the Microchip PIC microprocessor ( <b>Phase 2 Report due</b> )	Chap. 5 Chap. 6 handout
7	3/8 3/10 3/12	analysis of PHENOM firmware CITI (Collaborative Institutional Training Initiative) <a href="http://www.uri.edu/research/tro/compliance/IRB/training.html">http://www.uri.edu/research/tro/compliance/IRB/training.html</a> FDA regulations on medical devices	handout handout
8	3/15 3/17 3/19	Premarket Notification (510k) and Premarket Approval (PMA) introduction to biomedical signal processing ( <b>CITI certificate due</b> ) analog and digital filters ( <b>Phase 3 Report due</b> )	
9	3/22-26	no class this week (spring recess)	
10	3/29 3/31 4/2	Digital QRS detection multiplication of backward differences (MOBD) algorithm performance evaluation of QRS detection	handout handout
11	4/5 4/7 4/9	<b>Exam #2</b> false positive and false negative, sensitivity and specificity receiver operating characteristic (ROC) analysis	handout
12	4/12 4/14 4/16	statistics in biomedical research: t-test examples analysis of variance (ANOVA), linear regression pressure measurement techniques: pressure transducer, micromanometer	handout handout handout
13	4/19 4/21 4/23	frequency-domain characteristics of pressure measurement systems student project presentation: final oral report (session 1) student project presentation: final oral report (session 2)	Chap. 8
14	4/26 4/28 4/30	"pop test" of catheter/transducer system ( <b>Final Report due</b> ) flow measurement: electromagnetic flow probe, ultrasonic flow probe mean flow measurement by indicator dilution method	handout handout handout
15	5/3 5/7	Fick principle for measuring cardiac output W 9:00 - 11:00 am <b>Exam #3</b>	

**Grading:** Exam #1 (22%), Exam # 2 (22%), Exam # 3 (22%), CITI (4%), Project (30%).**Text:** *Medical Instrumentation: Application and Design*, 4th edition, edited by J. G. Webster, New York: John Wiley & Sons, 2009.