

BME 462 / ELE 562 Biomedical Instrumentation 3 credits, MWF11, K216, Spring 2013

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week	date	lecture topics	Reference
1	1/23 1/25	medical instrumentation, biocompatibility, biomaterials electrical safety: current levels for various electrical hazards	I-Ch. 1 I-Ch. 14
2	1/28 1/30 2/1	ground loop, patient isolation, noise rejection IEC 60601 Medical electrical equipment: safety & performance IEC 60601 Medical electrical equipment - continued	handout
3	2/4 2/6 2/8	FDA regulations on medical devices CITI training, IRB, IDE, 510k, PMA review of analog circuit design with operational amplifiers	handout I-Ch. 3
4	2/11 2/13 2/15	review of electrocardiogram (ECG) and ECG amplifier noninvasive measurement of arterial oxygen saturation (Reserved. Dr. Sun may need to give a talk at UConn.)	I-Ch. 4 handout handout
5	2/18 2/20 2/22	pulse oximetry photoplethysmogram circuit Exam #1	handout
6	2/25 2/27 2/29	neuronal action potentials and ionic currents voltage clamp, current clamp, dynamic clamps, and patch clamp amplifiers for biopotentials: design and applications	handout handout I-Ch. 6
7	3/4 3/6 3/8	the Universal Clamp project receiver operating characteristic (ROC) analysis false positive and false negative, sensitivity and specificity	handout handout
8	3/11	no class this week (spring recess)	
9	3/18 3/20 3/22	performance evaluation of QRS detection pressure measurement techniques: pressure transducer, micromanometer frequency-domain characteristics of pressure measurement systems	handout handout I-Ch. 8
10	3/25 3/27 3/29	flow measurement: electromagnetic flow probe, ultrasonic flow probe mean flow measurement by indicator dilution method Fick principle for measuring cardiac output	handout handout
11	4/1 4/3 4/5	Exam #2 introduction to biomaterials and tissue engineering autograft, isograft, allograft, and xenograft; biocompatibility	II-Ch. 1 handout
12	4/8 4/10 4/12	metals, ceramics, and polymers; sterilization techniques and effects examples of biomaterial failures and recalls of medical devices bio-tribology: friction, lubrication, wear	handout handout II-Ch. 3
13	4/15 4/17 4/19	protein-surface interactions adsorption and desorption; the Vronman effect bio-nanotechnology	handout
14	4/22 4/24 4/26	carbon nanotubes, chirality, and biomedical applications DNA sequencing and microarray technologies microfluidic systems, polydimethylsiloxane (PDMS) devices	handout handout handout
15	4/29 5/3	conclusions F 11:30 am - 1:30 pm Exam #3	handout

Grading: Exam #1 (24%), Exam # 2 (24%), Exam # 3 (24%), CITI (4%), Report (24%).**Text books** (recommended): **I.** *Medical Instrumentation: Application and Design*, 4th edition, edited by J. G. Webster, New York: John Wiley & Sons, 2009. **II.** *An Introduction to Tissue-Biomaterial Interactions*, by KC Dee, DA Puleo, R Bizios, Wiley 2002.