BME 315 INSTRUCTION SHEET Spring 2005
J. Enderle

COURSE: BME 315, Physiological Modeling.

GIVEN BY: Professor J. Enderle, Electrical & Systems Engineering, ABB 217C, Telephone: (860) 486-5521, Email: jenderle@bme.uconn

OBJECTIVES: Unified study of engineering techniques and basic principles in modeling physiological systems. Focuses on membrane biophysics, biological modeling, and systems control theory. Significant engineering and software design is incorporated in homework assignments using MATLAB and SIMULINK. For senior and graduate students.

TEXT: Enderle, J.D., Blanchard, S.M., and Bronzino, J.D., *Introduction to Biomedical Engineering*. Academic Press, San Diego, California, 2000. Available in the UConn COOP.

"Physiological Modeling: An Introduction for Biomedical Engineers," by J.D. Enderle. ***This is a collection of class notes available in COOP***

REFERENCES:

"Bioengineering: Biomedical, Medical, and Clinical Engineering," by A.T. Bahill
"Mathematical Models in the Health Science," by Ackerman & Gatewood
"Compartmental Analysis in Biology and Medicine," by Jacquez
"Introduction to Mathematical Biology," Rubinow
"Control Theory and Biological Systems," Grodins
"A Systems Approach to Biomedicine," Blesser
"Engineering Principals in Physiology," Brown & Gann
"Control Theory and Physiological Feedback Mechanisms," Riggs
"Circulatory System Dynamics," Noordergraaf
"Mathematical Modeling of Dynamic Biological Systems," Finkelstein

TESTS: There will be a closed book 1-½ hour midterm and a two-hour final examination.

COURSE GRADE:

Midterm	30%
Homework and Computer Projects	40%
Final	30%
	100%

BME 315 ASSIGNMENT SHEET Spring 2005

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LECTURE HOUR	TOPIC	Textbook Reading Assignment
1.	Introduction to Modeling Biomedical Systems	Chapter 1 & 2, 280-284
2.	Introduction to Models of Neurons	79-94
3.	Biophysics Tools	95-99
4.	The Goldman Equation	100-103
5.	Ion Pumps	103-105
6.	Equivalent Circuit Model	105-115
7.	Equivalent Circuit Model Continued	
8.	Hodgkin-Huxley Model	115-131
9.	Hodgkin-Huxley Model	Class Notes
10.	SIMULINK	Class Notes
11.	SIMULINK	Class Notes
12.	Translational Mechanical Systems	Class Notes
13.	Rotational Systems	Class Notes
14.	Linearizing Nonlinear Systems	Class Notes
15.	System Identification	343-352
16.	Analysis of Linear Second Order Systems	353-359
17.	Models of Human Movement	284-289
18.	Problems in Human Movement	290-300
19.	A Mechanical Model of Muscle	300-303
20.	Elasticity, Viscosity	304-318
21.	Nonlinear Reciprocal Innervation Model	Class Notes
22.	Linear Homeomorphic Eye Movement Model	318-324
23.	Frequency Response	Class Notes
24.	Modified Linear Homeomorphic Eye Movement Model	324-334
25.	Other Linearization Considerations	Class Notes
26.	MIDTERM	
27.	MIDTERM	
28.	Review Midterm	
29.	Review Midterm	
30.	Single Compartment Model	369-372
31.	Two Compartment Model	372-383
32.	Blood Glucose Regulatory Model	383-390, 396-401
33.	Problems in Compartmental Analysis	390-396
34.	Modified Compartmental Analysis	Class Notes
35.	Regulation of Carbon Dioxide in the Human Body	401-406
36.	Transfer of Substances between a Thin Membrane	Class Notes
37.	Dye Dilution Model	Class Notes
38.	Dye Dilution Model	Class Notes
39.	Infectious Disease Models	Class Notes
40.	Epidemics	Class Notes
41.	Reed-Frost Model of Epidemics	Class Notes
42.	Stochastic Communicable Disease Model	Class Notes
43.	Measles Application	Class Notes
44.	Stochastic Infectious Disease Models	Class Notes
45.	Stochastic Infectious Disease Models Continued	Class Notes