

BME121 QUANTITATIVE PHYSIOLOGY: ORGAN TRANSPORT SYSTEMS

Catalog Data:	BME121 Quantitative Physiology: Organ Transport Systems (Credit Units: 4) W. A quantitative and systems approach to understanding physiological systems. Systems covered include the cardiopulmonary, circulatory, and renal systems. Prerequisite: Mathematics 3D or equivalent, or consent of instructor. Same as CBEMS104. Concurrent with BME221, CBEMS204. Formerly Engineering E110A. (Design units: 1)
Textbook:	Seeley, Stephens, and Tate. <i>Anatomy & Physiology</i> , 6 th edition, McGraw-Hill, 2002.
References:	None.
Coordinator:	Steven C. George
Course Outcomes:	Students will be able to: Describe and identify basic anatomical features of the pulmonary and cardiovascular systems. Describe both qualitatively and quantitatively the fundamental physiological functions of the pulmonary and cardiovascular systems. Perform fundamental mass balances as applied to physiological systems, and solve the resulting first order differential equations. Apply knowledge of anatomy and physiology of the pulmonary and cardiovascular systems together with basic engineering principles to design solutions to current medical problems.
Prerequisites By Topic:	Deferential Equations.
Lecture Topics:	Cardiac anatomy. Mechanical analysis of heart Chambers, pressure flow relations. Electrophysiological analysis of conduction in heart. Circulatory anatomy. Pressure flow relationships in arterial and venous trees. Blood and blood substitutes. Anatomy of the lungs. Gas exchange properties of the lungs, quantitative description. Mechanical properties of the lungs. Respiratory Control. Midterm and Final.
Class Schedule:	Each class meets 3 hours per week for 10 weeks and students are assigned to a 1 hour discussion session per week.
Computer Usage:	Word processing of written solutions to design problems, and basic spreadsheet calculations.
Laboratory Projects:	None.

Professional Component: Contributes toward Biomedical Engineering Topics and Major Design experience.

Relationship to Program Outcomes: This course relates to program outcomes 1, 2, 3, and 4 as stated at: http://www.eng.uci.edu/dept/objective_biomedical.

Design Content Description

Approach: Small group discussion of open ended biomedical design problems (problem based learning). Written reports of design solution. (50%)

Lectures: Description of mathematical models which describe physiologic function and can be used in the design of solutions of pulmonary or cardiovascular problems. (50%)

Laboratory Portion:

Grading Criteria:

Weekly Homework:	10%
Written reports:	25%
Midterm exam:	25%
Final exam:	<u>40%</u>
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: 0 credit units or 0%

Engineering Science: 3 credit units or 75%

Engineering Design: 1 credit units or 25%

Prepared by: Steven C. George **Date:** July 2005

CEP Approved: Fall 2002