



Course title and number      BMEN 452/689 Mass and Energy Transfer in Biosystems  
Term                                Spring 2012  
Meeting times and location    MWF 11:30-12:20 in 1035 Emerging Technologies Building (ETB)

### Course Description and Prerequisites

To provide upper-level students in Biomedical Engineering a fundamental knowledge of mass and heat transport processes and their applications to biomedical systems - osmosis, electrochemical potential, active transport, oxygen transport, pharmacokinetic analysis, etc.

**Prerequisites:** BMEN 282 or graduate status

### Learning Outcomes

At the end of this course, students will be able to:

1. Understand the derivation and utilization of conservation principles in mass transport.
2. Understand the transport-related properties of the extracellular matrix and tissues.
3. Understand the role of osmosis in membrane and capillary wall transport, and the factors that affect the osmotic pressure.
4. Understand the effects of mass transport upon biochemical reactions.
5. Understand the roles of hemoglobin, alveoli and the vascular system in tissue oxygenation.
6. Understand the drug delivery, distribution, and elimination processes.

### Instructor Information

Name                                Roland Kaunas, Ph.D.  
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Office hours                        By appointment

### Textbook and/or Resource Material

*Transport Phenomena in Biological Systems* by Truskey, Yuan & Katz, Publisher: Pearson Prentice Hall, 1st or 2nd editions

### Grading Policies

<b>Evaluation:</b>	Homework/Quizzes	20%	<b>Letter Grading Scale:</b>	A = 90-100
	Project	15%		B = 80-89
	Midterms (2)	40%		C = 70-79
	Final Exam	<u>25%</u>		D = 60-69
		100%		F < 60

**Exams:** Exams for graduate students are oral and will be scheduled one week prior to administration of exam.

**Late Assignments:** Late assignments resulting from occasions other than excused absences are subject to penalty.

<u>Hours</u>	<u>Topic</u>	<u>Chapter:Sections</u>
3	Introduction to transport phenomena	1:All
3	Molecular transport	6:1-6
4	Conservation and constitutive relations	
4	Steady and unsteady diffusion	6:7-8
3	Diffusion-limited reactions	6:9
4	Diffusion with convection	7:1-4,6-9
3	Transport in porous media	8:1-4
3	Transvascular transport	9:All
4	Mass transport and biochemical interactions	10:All
3	Transport in organs	13:1-5
3	Transport in organisms	16:1-4
3	Energy and bioheat transport	17:1-4
<u>2</u>	Midterms	
<b>42</b>	<b>Total</b>	

### **Americans with Disabilities Act (ADA)**

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit <http://disability.tamu.edu>

### **Academic Integrity**

For additional information please visit: <http://www.tamu.edu/aggiehonor>

*"An Aggie does not lie, cheat, or steal, or tolerate those who do."*

### **Attendance Policy and Grading Scale Examples**

"The University views class attendance as the responsibility of an individual student. Attendance is essential to complete the course successfully. University rules related to excused and unexcused absences are located on-line at <http://student-rules.tamu.edu/rule07>."