

TO: Faculty of the Schools of Engineering  
FROM: Faculty of the School of Chemical Engineering  
SUBJECT: New Graduate Level Course

The Faculty of the School of Chemical Engineering has approved the following new course effective Spring 1997. Approval of the Faculty of the Schools of Engineering is requested for ChE 658.

**CHE 658. BIOMEDICAL PHENOMENA**

**A. COURSE DESCRIPTION**

Semester 2, Class 3, Lab 0, Credit 3  
Prerequisites: ChE 620 and 621 or equivalent advanced transport phenomena courses

Human anatomy and physiology, physiology and rheology of blood and other biological fluids, biomedical fluid mechanics, flow in elastic conduits and microcirculation, heat transfer in the body, placenta, mass transfer in biological fluids and tissue, passive, active and facilitated transport, pinocytosis, biomedical reaction engineering, metabolism and catabolism, pharmacokinetics, artificial organs, design and operation, biochemical and ion-exchange processes in biological fluids, biomedical materials and biointerfacial phenomena, tissue engineering, cellular adhesion.

**B. REASON**

The purpose of this course is to introduce chemical engineers to engineering problems in medicine and to teach them to solve problems of design of artificial organs and other devices.

APPROVED FOR THE FACULTY  
OF THE SCHOOLS OF ENGINEERING  
BY THE COMMITTEE ON  
FACULTY RELATIONS

CFR Minutes 864

Date 11/25/96

Chairman CFR R. Neal Houze



G. V. Reklaitis, Head  
School of Chemical Engineering

## SUPPORTING DOCUMENTATION

1. **Justification:**  
In response to the increased interest of chemical engineering students in the field of biomedical engineering, we have been offering a sequence of biomedical courses with emphasis on biomedical transport phenomena and cellular engineering. This course has been offered as ChE 697M three times and has been well received. Ten students took it for credit during Spring 1982, nine in Spring 1991 and fourteen in Spring 1996.
2. **Level:** Graduate Course
3. **Prerequisites:** ChE 620 and 621 or equivalent advanced transport phenomena courses.
4. **Course Instructor:** Professor N. A. Peppas
5. **Course Outline:**

<u>Topics</u>	<u>No. of Lectures</u>
a. Introduction, physiology	3
b. Rheology	4
c. Biomedical fluid mechanics	6
d. Microcirculation	2
e. Heat transfer in the body	3
f. Mass transfer in biological systems	6
g. Hemodialysis	3
h. Other artificial organs	6
i. Biomaterials	6
j. Tissue engineering, cellular engineering	6

6. **Text:**

E.N. Lightfoot, "Transport Phenomena and Living Systems", Wiley, NY 1974.

References:

A.C. Guyton, "Textbook of Medical Physiology," Saunders, Philadelphia, 1991.

D.O. Cooney, "Principles of Biomedical Engineering," Dekker, NY 1976.

D.A. Lauffenburger and J.L. Linderman, "Receptors," Oxford University Press, 1993.

