

CURRICULUM PROPOSAL FORM

(12)

***DEADLINES:**

REGULAR COURSE PROPOSALS: OCTOBER 23, 1998 FOR FALL, 1999 AND FEBRUARY 19, 1999 FOR SPRING, 2000
SHORT-TERM COURSE PROPOSALS: DECEMBER 11, 1998 FOR FALL, 1999 AND MARCH 26, 1998 FOR SPRING 2000

PROPOSAL TITLE: Principles of Biomedical Processes

SPONSOR/S: Dr Stephanie H Farrell + Chem Eng Curriculum Committee

DEPARTMENT: Chemical Eng 6906 472

CHECK ALL THAT APPLY:

UNDERGRADUATE GRADUATE

COLLEGE: Engineering

IF LAS: History/Humanities
 Math/Sciences
 Social/Behavioral Sciences

TYPE OF PROPOSAL (Check ALL that Apply)

<input type="checkbox"/> General Education	<input checked="" type="checkbox"/> New Course (NOT Gen. Ed.)
<input type="checkbox"/> New Course in _____ Bank	<input type="checkbox"/> Name Change (Dept., School, Major)
<input type="checkbox"/> Existing course, Add To _____ Bank	<input type="checkbox"/> Changes in Degree Requirements
<input type="checkbox"/> Multicultural/Global Designation	<input type="checkbox"/> Changes Involve Gen. Ed. requirements
<input type="checkbox"/> Writing Intensive Designation	<input type="checkbox"/> Minor Changes to Existing Courses
<input type="checkbox"/> New Minor/Concentration/Specialization	<input type="checkbox"/> Course is NOT General Education
<input type="checkbox"/> New Major/Degree Program	<input type="checkbox"/> Course IS General Education
<input type="checkbox"/> Short Term Course Proposal	

DEPARTMENT (SIGNATURE INDICATES APPROVAL)

<u>Robert P. Heskeith</u> 10/22/98	<u>[Signature]</u> 10-22-98
DEPT. CURRICULUM CHAIR / DATE	DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 2/9/99

APPROVED
 NOT APPROVED

COMMENTS:

Robert P. Heskeith 2/9/99
SIGNATURE DATE

ACADEMIC DEAN (& GRADUATE DEAN, for New Graduate Programs Only)

APPROVED
 NOT APPROVED

COMMENTS:

[Signature] 10/22/98
SIGNATURE (Academic Dean) DATE

[Signature] _____
SIGNATURE (Graduate Dean) DATE

UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 4/30/99

APPROVED

NOT APPROVED

COMMENTS:

Biology Dept. approved (consultation)

Francis J. Jones *5/12/99*
SIGNATURE DATE

SENATE

Date announced at Senate *4/30/99*

Voted upon at Senate: **Approved** **Not Approved** **Date:**

EXECUTIVE VICE PRESIDENT/PROVOST

APPROVED

NOT APPROVED If no, reasons are as follows:

STUDENT CREDIT HOURS _____ FACULTY LOAD HOURS _____ EQUALIZED CREDIT HOURS _____

OFFICIAL COPY & APPROVAL SHEET FILED (DATE): _____

DATE/SIGNATURE EXECUTIVE VICE PRESIDENT/PROVOST *C. M. O'Neil* *5/30/99*

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED _____

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED *C906.47.2*

DATE/SIGNATURE OF REGISTRAR *Robert A. Hubel* *7/10/99*

NOTIFICATION FORWARD:

SENATE CURRICULUM COMMITTEE CHAIRPERSON

DEPARTMENT CHAIRPERSONS

ACADEMIC DEAN(S)

REGISTRAR

SPONSOR(S)

7/10/99

Course Proposal

1. Details:

- a) Course Title:** Principles of Biomedical Processes (0906.472)
b) Sponsor: Dr. Stephanie H. Farrell and
Chemical Engineering Curriculum Committee
c) Credit Hours: 3 credit hours
d) Course Level: Senior
e) Curricular Effect: Technical elective for engineering majors
f) Prerequisites: Chemistry I, Calculus II (1906.100; 1701.131)
**g) Suggested Time/
Scale of Implementation:** Fall 1999
1 section
h) Resources: Faculty will be hired consistent with the College of
Engineering multi-year budget. No computer software
beyond what is currently being acquired for approved
course will be necessary. Laboratory equipment will be
obtained consistent with the College of Engineering capital
budget. Library acquisitions will be required consistent
with current acquisition plan.

2. Rationale:

The proposed course is a new offering consistent with other courses in the Engineering Curriculum Proposal approved by the College Senate in December 1994. The proposed course is consistent with the establishment of the College of Engineering approved by the Board of Trustees in February 1995.

The proposed course is a Technical Elective for all Engineering majors and satisfies the Engineering Topics credit requirements of the Education and Accreditation Committee (EAC) of the American Institute of Chemical Engineers (AIChE) for accreditation of the Chemical Engineering program by the Accreditation Board for Engineering and Technology (ABET). This course will have sufficient advanced chemistry to count towards the Advanced Chemistry requirement for Chemical Engineering majors.

The course will address the areas of biomedical engineering that are important multidisciplinary topics relevant to many areas of engineering and science. The course will describe the basic principles of biomedical processes. This will include an introduction to drug delivery and pharmacokinetics, blood flow an circulatory system, transport across membranes, and human and artificial organs.

3. Essence of the Course:

- a) Objectives:**

Upon completion of the course, students will be able to:

1. Understand the fundamentals of thermodynamics, kinetics and mass transfer as related to biomedical processes.
2. Design biomedical devices.
3. Model and simulate biomedical processes.
4. Understand the basic mechanisms of various biomedical processes.
5. Use computer software to analyze biomedical problems.
6. Work in teams to solve open-ended design problems.

b) Topical Outline:

The topics to be covered are listed below. The instructor will supply the students with a syllabus during the first week of classes. The instructor will assess any technology advances in the subject matter prior to the course and make topic changes as deemed appropriate to maintain the level and currency of instruction.

Introduction to biomedical systems

- Interdisciplinary nature of Biomedical systems
- How Chemical Engineering Principles apply to Biomedical Processes
- Mass Transfer
- Heat Transfer
- Fluid Flow
- Chemical Reaction

Drug Delivery

- Objectives
- Traditional methods
- Controlled release
- Mechanisms of controlled release
- Modeling of controlled release systems

Pharmacokinetics

- Dissolution, absorption, metabolism, excretion
- Single and multiple dose
- Injection, ingestion, and controlled delivery
- Pharmacokinetic models

Circulatory system

- Transport processes in physiology
 - Mass transfer

- Fluid flow
- Heat transfer

Transport through cell membranes

Membrane structure, composition, and permeability

Solvent movement across membranes

Solute movement across membranes

Organs

Human and artificial kidney

Human and artificial pancreas

Human heart and artificial heart

c) Evaluation and Grading Procedure of Students:

Student grades will be based on examinations, homework and/or projects. A course syllabus with a stated method of arriving to the final grade, e.g., number of exams, projects, homework, percentage of grade, will be distributed to students the first week of classes.

d) Course Evaluation:

The proposed course will be evaluated on the basis of student evaluations and curriculum review by appropriate faculty.

4. Results of Consultations:

The proposed course is part of the Engineering Curriculum Proposal approved by the Faculty Senate in December 1994. No consultations are relevant.

Catalog Description

Principles of Biomedical Processes (0906.472)

Prerequisite: Chemistry I (1906.100), Calculus II (1701.131)

This course introduces students to of chemical engineering fundamentals applied to biomedical systems. Students analyze and design biomedical processes. The basic biochemistry and physiology required for understanding of biomedical systems is presented. Basic principles of mass transfer, heat transfer, fluid flow and chemical reaction are used to analyze or design drug delivery systems, pharmacokinetic models, the circulatory system, transport across cell membranes, and human and artificial organs. Laboratory experiments and demonstrations will be integrated throughout the course.