

CURRICULUM PROPOSAL FORM

***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: Biomedical Process Engineering

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

DEPARTMENT: Chemical Eng

UM 572

CHECK ALL THAT APPLY:

UNDERGRADUATE **GRADUATE**

COLLEGE: Engineering

If LAS: **History/Humanities**
 Math/Sciences
 Social/Behavioral Sciences

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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 <u>Bank</u> | <input type="checkbox"/> Name Change (Dept., School, Major) |
| <input type="checkbox"/> Existing course, Add To <u>Bank</u> | <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)

Robert P. Heaketh 10/22/98
DEPT. CURRICULUM CHAIR / DATE

[Signature] 10-22-98
DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE
DATE OF OPEN HEARING (if necessary) _____

APPROVED
 NOT APPROVED

COMMENTS:

Robert P. Heaketh 2/19/99
SIGNATURE DATE

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

APPROVED
 NOT APPROVED

COMMENTS:

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

SIGNATURE (Graduate Dean) DATE

UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 4/26/99

APPROVED

NOT APPROVED

COMMENTS:

Consultation - Faculty approved

Annita Rice *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. J. Mad... *5/12/99*

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED _____

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED *0906.572*

DATE/SIGNATURE OF REGISTRAR

Robert A. Kubat *7/14/99*

NOTIFICATION FORWARD:

_____ SENATE CURRICULUM COMMITTEE CHAIRPERSON

_____ DEPARTMENT CHAIRPERSONS

_____ ACADEMIC DEAN(S)

_____ REGISTRAR

_____ SPONSOR(S)

Course Proposal

1. Details:

- a) Course Title:** Biomedical Process Engineering (0906.572)
b) Sponsor: Dr. Stephanie H. Farrell and
Chemical Engineering Curriculum Committee
c) Credit Hours: 3 credit hours
d) Course Level: Graduate
e) Curricular Effect: Technical elective for engineering graduate courses
f) Prerequisites: Graduate standing and approval of Graduate Advisor
g) Suggested Time/ Fall 1999
Scale of Implementation: 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 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 in a 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 a required semester project. 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

Biomedical Process Engineering (0906.572)

Prerequisite: Graduate standing and approval of Graduate Advisor

This course introduces students to applications of chemical engineering fundamentals to biomedical systems. Students analyze and design biomedical processes. The basic biochemistry and physiology required for understanding of biomedical systems is presented. Advanced 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.