

Spring 97

2

ROWAN COLLEGE CURRICULUM COMMITTEE

PROPOSAL TITLE: Biochemical Engineering

 UNDERGRADUATE GRADUATE 3 CREDIT HOURS

SPONSOR(S): C. Stewart Slater and School of Engineering Curriculum Committee

DEPARTMENT & TELEPHONE# Chemical Engineering 24631

CHECK ONE: COURSE MINOR PROGRAM CONCENTRATION SPECIALIZATION
 ACHIEVEMENT CERTIFICATE CERTIFICATION PROGRAM MAJOR PROGRAM

STEP #1 (DEPARTMENT)	STEP #2 (RECEIPT)	STEP #3 (SCHOOL)
APPROVED/DATE: _____ NOT APPROVED/DATE: _____ <u>N/A</u> DEPT. CURRICULUM CHR. _____ REVIEWED/DATE: _____ <u>N/A</u> DEPT. CHR. _____	SCC# <u>CRS-96-136</u> DATE RECEIVED: <u>2-21-96</u> _____ SENATE CURRICULUM CHR. _____	REVIEWED DATE: <u>2-14-96</u> <input checked="" type="checkbox"/> RECOMMEND TO APPROVE <input type="checkbox"/> RECOMMEND NOT TO APPROVE FORWARD FOR OPEN HEARING <input checked="" type="checkbox"/> WITHOUT RESERVATIONS <input type="checkbox"/> WITH RESERVATIONS COMMENTS: _____ SCHOOL COMMITTEE CHR. _____

STEP #4 (ACADEMIC DEAN) COMMENTS:

RECOMMEND
 NOT RECOMMEND
 CONDITIONALLY RECOMMEND (SEE COMMENTS)
 DATE & SIGNATURE, DEAN OF SCHOOL J. P. Sweeney 2/16/96

STEP #5 (SENATE CURRICULUM COMMITTEE)

DATE OF OPEN HEARING _____

APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) 4/16/96

RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:

STEP #6 (SENATE)

DATE PRESENTED TO SENATE 1/27/96 APPROVED NOT APPROVED

NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST (DATE) _____

SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE Charles J. Fisher 5/3/96

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED 5/20/96

APPROVED: YES NO

IF NO, REASONS ARE AS FOLLOWS:

STUDENT CREDIT HOURS 3

FACULTY LOAD HOURS 3

EQUALIZED CREDIT HOURS _____

OFFICIAL COPY & APPROVAL SHEET FILED (DATE) 5/20/96

SIGNATURE, EXECUTIVE VICE PRESIDENT/PROVOST [Signature]

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED 5/30/96

HEGIS TAXONOMY AND COURSE NUMBER ASSIGNED 0906.510

DATE/SIGNATURE OF REGISTRAR B. Kelly

NOTIFICATION FORWARD:

___ SENATE CURRICULUM COMMITTEE CHAIRPERSON

___ DEPARTMENT CHAIRPERSON(S)

___ ACADEMIC DEAN(S)

___ REGISTRAR

___ SPONSOR(S)

Course Proposal

1. Details:

- a) Course Title:** Biochemical Engineering
b) Sponsor: School of Engineering Curriculum Committee
Dr. C. Stewart Slater, Chemical Engineering
c) Credit Hours: 3 credit hours
d) Course Level: Graduate
e) Curricular Effect: Technical Elective for Engineering Graduate students
f) Prerequisites: Graduate Engineering standing and approval of Grad. Advisor
**g) Suggested Time/
Scale of Implementation:** Spring 1997
1 section
h) Resources: Faculty will be hired and laboratory equipment obtained
consistent with Engineering School multi-year budget.
Library acquisitions will be required.

2. Rationale:

The proposed course is a graduate elective in the School of Engineering and is consistent with the establishment of the School of Engineering approved by the Board of Trustees in February 1995.

The course will address the process aspects of biotechnology - one of the most widely recognized emerging multidisciplinary fields for the 21st century. Bioprocess engineering principles are critical in the research and development of new drug production, health care devices, bioremediation of hazardous waste, and specialty chemical/biochemical production. This course will allow chemical engineering students to broaden their career options.

3. Essence of the Course:

a) Objectives:

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

1. Understand the different fields of biotechnology.
2. Combine the essential aspects of biochemistry, microbiology, and genetics with engineering principles.
3. Understand how to mathematically model bioprocesses.
4. Perform design and scale-up calculations on bioreactors.

5. Select the proper purification and recovery process and design a series of processes.
6. Work in groups to solve open-ended design problems.
7. Collect and analyze laboratory data using experimental systems such as fermentors and microfiltration units.

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

- Biotechnology and biochemical engineering
- Interface between science and engineering

Overview of biotechnology basics necessary for processing

- Cells and microbial diversity
- Enzyme kinetics
- Cell function
- Metabolic pathways

Cell growth and product formation

- Batch growth and kinetics
- Continuous culture growth
- Stoichiometry of microbial growth and product formation

Process considerations for bioreactors for suspensions and immobilized cultures

- Batch and continuous reactors
- Immobilized cell systems
- Solid-state fermentations

Selection, scale-up, and control of bioreactors

- Scale-up difficulties
- Bioreactor instrumentation and control
- Sterilizing process fluids

Separation of insoluble products

- Filtration/microfiltration
- Centrifugation
- Cell disruption

Isolation/purification of soluble products

Extraction

Adsorption

Chromatography

Precipitation

Finishing steps for purification

Crystallization

Drying

Ancillary process operations

Water quality

Solvent recovery

Waste disposal

Laboratory experiments and demonstrations will be integrated throughout the course.

c) Evaluation and Grading Procedure of Students:

Student grades will be based on examinations, homework and a required project. A course syllabus with a stated method of arriving 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.

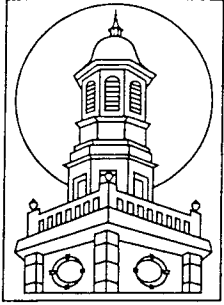
4. Results of Consultations:

Consultations have been made with Chemistry faculty in the Department of Chemistry and Physics who have provided a letter of support.

Catalog Description

The fundamentals and engineering of bioprocess engineering with emphasis on applying biotechnology to industrial processes. Essential aspects of biochemistry, microbiology and kinetics. Discussion of bioreactor engineering, and recovery and purification processes. Processing applications of engineering kinetics and enzyme technology. Laboratory experiments and demonstrations will be integrated throughout the course.

(Prerequisite: Graduate standing)



Rowan College of New Jersey

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Department of Chemistry and Physics

To: Curriculum Committee
From: Robert Newland, Chairperson
Subject: Chemical Engineering Technical Electives
Date: February 15, 1996

A handwritten signature in black ink, appearing to read 'RN', located to the right of the header information.

I have examined the course proposals listed below and find them in accord with the previously submitted curriculum plan. I also have noted where courses require chemistry and /or physics prerequisites and am convinced there are no additional resources required to meet this demand for our courses. We fully support these proposals.

Electrochemical Engineering
Environmental Regulations in Technology Industries
Environmental Considerations in Process Design
Process Safety
Membrane Process Technology
Advanced Separation Technology
Process Heat Transfer
Fluid Flow in Processing and Manufacturing
Advanced Reactor Design
Bioprocess Engineering
Transport Phenomena