

# CURRICULUM PROPOSAL FORM

0906.574

**\*DEADLINES:**

ANNUAL 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: Bioseparation Processes

SPONSOR/S: C. Stewart Slater and Chemical Engineering Curriculum Committee

DEPARTMENT: Chemical Engineering

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 <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. Herbeth 12/1/98      [Signature] 12-1-98

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. Herbeth      2/9/99

SIGNATURE      DATE

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

APPROVED  
 NOT APPROVED

COMMENTS:

[Signature]      12/2/98

SIGNATURE (Academic Dean)      DATE

[Signature]      \_\_\_\_\_

SIGNATURE (Graduate Dean)      DATE

**UNIVERSITY CURRICULUM COMMITTEE**

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

APPROVED

NOT APPROVED

COMMENTS:

Janette Rivers 3/4/99  
SIGNATURE DATE

**SENATE**

Date announced at Senate 2/23/99

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 [Signature]

**REGISTRAR**

DATE APPROVED COURSE DESCRIPTION RECEIVED \_\_\_\_\_

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED CYR6.576

DATE/SIGNATURE OF REGISTRAR Robert A. Kubat 3/25/99

**NOTIFICATION FORWARD:**

SENATE CURRICULUM COMMITTEE CHAIRPERSON

DEPARTMENT CHAIRPERSONS

ACADEMIC DEAN(S)

REGISTRAR

Jim 3/31/99

SPONSOR(S)

## *Course Proposal*

### *1. Details:*

- a) Course Title:** Bioseparation Processes (0906.576)  
**b) Sponsor:** Dr. C. Stewart Slater and  
Chemical Engineering Curriculum Committee  
**c) Credit Hours:** 3 credit hours  
**d) Course Level:** Graduate  
**e) Curricular Effect:** Technical Elective for chemical engineering majors  
**f) Prerequisites:** Graduate standing and approval of graduate advisor  
**g) Suggested Time/**  
**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 graduate elective in the College of Engineering and is consistent with the establishment of the College of Engineering approved by the Board of Trustees in February 1995.

The course will address the area of bioseparation process engineering that is important multidisciplinary topic relevant to many areas of engineering and science. The course will describe the basic principles of bioprocess separation unit operations and process systems and applications to downstream processing in the pharmaceutical and biotechnology industry.

### **3. Essence of the Course:**

#### **a) Objectives:**

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

1. Understand the fundamentals of mass transfer, rate-controlled separations, physical separations, and thermodynamics as related to bioprocess separations.
2. Understand the critical physical, chemical and biological parameters in bioseparation process design.
3. Model and simulate bioseparation processes.
4. Understand the role of unit processes in the removal of insolubles, isolation, product purification and polishing.
5. Understand bioseparation principles applied in commercial design case studies such as antibiotic production, enzyme production, citric acid manufacture, etc.
6. Use computer software to analyze bioseparation engineering problems.
7. 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.

- Overview of bioseparations
  - Characteristics of bioseparations
  - Typical process schematics
- Filtration and Microfiltration
  - Equipment for conventional filtration
  - Pretreatment
  - Continuous rotary filters
  - Microfiltration
- Centrifugation
  - Settling of solids
  - Centrifuges
  - Scale-up of centrifugation

- Cell disruption
  - Chemical methods
  - Mechanical disruption
- Extraction
  - Batch extraction
  - Staged extraction
  - Differential extraction
  - Fractional extraction
- Adsorption
  - Batch adsorption
  - Adsorption in fixed beds
- Elution Chromatography
  - Adsorbents
  - Yield and purity
  - Discrete stage analysis
  - Kinetic Analysis
  - Scale-up chromatography
- Precipitation
  - Precipitation with nonsolvents and salts
  - Precipitation with temperature
  - Large scale precipitation
- Ultrafiltration and electrophoresis
  - Ultrafiltration
  - Electrophoresis
- Crystallization
  - Crystal size distribution
  - Batch crystallization
- Drying
  - Drying theory and design considerations
  - Drying equipment
  - Conduction drying
- Ancillary operations
  - Water quality
  - Solvent recovery
  - Waste disposal
  - Biosafety

**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:***

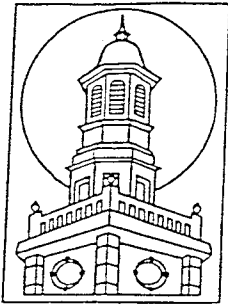
The course is a technical elective for graduate chemical engineering students. The course does not impact any other program and therefore no consultations are required.

## *Catalog Description*

### **Bioseparation Processes (0906.576)**

*Prerequisite: Graduate standing and approval of graduate advisor*

This course will focus on the fundamental principles of bioseparation processes. The characteristics of bioseparations will be presented as applied to downstream processing in the pharmaceutical/ biotechnology and related industries. Theory and design of filtration, microfiltration, centrifugation, cell disruption, extraction, adsorption, chromatography, precipitation, ultrafiltration, crystallization, and drying will be presented as applied to biosystems. Commercial design considerations such as sanitary design/sterilization, water quality, solvent recovery, waste disposal and biosafety will be reviewed.



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 distribution list.

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