Fall 96

(1)

ROWAN COLLEGE
CURRICULUM COMMITTEE

ROPOSAL TITLE: Membrane Process Technology

___UNDERGRADUATE X GRADUATE 3 CREDIT HOURS

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

DEPARTMENT & TELEPHONE# Chemical Engineering x4631

CHECK ONE: X COURSE __MINOR PROGRAM __CONCENTRATION __SPECIALIZATION

__ACHIEVEMENT CERTIFICATE __CERTIFICATION PROGRAM __MAJOR PROGRAM

STEP #1 (DEPARTMENT)

___APPROVED/DATE:

___NOT APPROVED/DATE: N/A

DEPT. CURRICULUM CHR.

___REVIEWED/DATE:

N/A

DEPT. CHR.

STEP #2 (RECEIPT)

SCC# C15 96-143

DATE RECEIVED: 2-21-96

SENATE CURRICULUM CHR.

STEP #3 (SCHOOL)

REVIEWED DATE:- 2-14-96

X RECOMMEND TO APPROVE

___RECOMMEND NOT TO APPROVE

FORWARD FOR OPEN HEARING

X WITHOUT RESERVATIONS

___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. Stacey 2/16/96

STEP #5 (SENATE CURRICULUM COMMITTEE)

DATE OF OPEN HEARING ____

APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) 2/16

___RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:

STEP #6 (SENATE)

DATE PRESENTED TO SENATE 4-23-96 ___APPROVED ___NOT APPROVED

NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST (DATE)____

SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE 5/3/96

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED [illegible] 1996

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 0906.508

DATE/SIGNATURE OF REGISTRAR 132 [signature]

NOTIFICATION FORWARD:

___SENATE CURRICULUM COMMITTEE CHAIRPERSON

___DEPARTMENT CHAIRPERSON(S)

___ACADEMIC DEAN(S)

___REGISTRAR

___SPONSOR(S)

\CURRIC6L.WPD\

Course Proposal

1. Details:

a) Course Title:	Membrane Process Technology
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:	Fall 1996 1 section
h) Resources:	Faculty are present to teach this course. Library resources will be supplemented by instructor for the first offering of the course. Future acquisitions will be required.

2. Rationale:

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

The course will address membrane process technology beyond the fundamentals taught in an undergraduate offering. This course is an essential to have as an elective for students to provide the added depth to the program. Process engineering learned in this course will enable students to be better prepared to develop and design modern separation systems. Membrane processes are utilized in many industries for waste minimization, reuse/recovery, and ultrapurification. The course will give students a course that serves the two technology focus groups of Environmental and Manufacturing/Processing Engineering.

3. Essence of the Course:

a) Objectives:

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

1. Understand the fundamental transport mechanism of membrane processes.
2. Determine the difference between various membrane operations in terms of the driving force utilized and the components being separated.

3. Comprehend various membrane manufacturing and characterization techniques.

4. Select the appropriate membrane material for the separation desired.

5. Specify module configuration and overall system design.

6. Understand the theory, design and application of reverse osmosis, nanofiltration, ultrafiltration, microfiltration, dialysis, electromembrane processes, gas permeation, and Pervaporation.

7. Work in groups 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
- History
- Definition of a membrane
- Nomenclature

Membrane process overview
- Components separated
- Driving force
- Mechanism of transport

Membrane materials and structure
- Porous and non porous materials
- Polymers, ceramics and metallic material properties
- Membrane characterization
- Membrane fabrication

Membrane process design
- Module configuration
- System design arrangements

Principles, design and applications of unit processes
- Reverse osmosis
- Nanofiltration
- Ultrafiltration
- Microfiltration
- Dialysis
- Electromembrane processes
- Gas permeation

Pervaporation
Liquid membranes
Novel and hybrid systems

Laboratory demonstrations

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 based on 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

Principles of membrane processes: reverse osmosis, ultrafiltration, microfiltration, electrodialysis, pervaporation, gas permeation, and their application to traditional and emerging fields. Membrane materials and structure. Mass transfer and design aspects for both liquid and gas separation systems.

(Prerequisite: Graduate standing)

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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

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