

ROWAN COLLEGE CURRICULUM COMMITTEE

PROPOSAL TITLE: Transport Phenomena 0906-461

SPONSOR(S): [X] UNDERGRADUATE [] GRADUATE 3.0 CREDIT HOURS
S. Stewart Water and School of Engineering Curriculum Committee

DEPARTMENT & TELEPHONE# Chemical Engineering x 4631

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

<p>STEP #1 (DEPARTMENT)</p> <p>APPROVED/DATE: _____</p> <p>NOT APPROVED/DATE: _____</p> <p>DEPT. CURRICULUM CHR. <u>N/A</u></p> <p>REVIEWED/DATE: _____</p> <p>DEPT. CHR. <u>N/A</u></p>	<p>STEP #2 (RECEIPT)</p> <p>SCC# <u>915-46-133</u></p> <p>DATE RECEIVED: <u>2/21/96</u></p> <p>SENATE CURRICULUM CHR. <u>[Signature]</u></p>	<p>STEP #3 (SCHOOL)</p> <p>REVIEWED DATE: <u>2-14-96</u></p> <p>[X] RECOMMEND TO APPROVE</p> <p>[] RECOMMEND NOT TO APPROVE</p> <p>FORWARD FOR OPEN HEARING</p> <p>[X] WITHOUT RESERVATIONS</p> <p>[] WITH RESERVATIONS</p> <p>COMMENTS:</p> <p>SCHOOL COMMITTEE CHR. <u>[Signature]</u></p>
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STEP #4 (ACADEMIC DEAN) COMMENTS:

[X] RECOMMEND

[] NOT RECOMMEND

[] CONDITIONALLY RECOMMEND (SEE COMMENTS)

DATE & SIGNATURE, DEAN OF SCHOOL: J. M. [Signature] 2/16/96

STEP #5 (SENATE CURRICULUM COMMITTEE)

DATE OF OPEN HEARING: 9/23/96

APPROVED BY SENATE CURRICULUM COMMITTEE (DATE): 2/21/96

[] RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:

STEP #6 (SENATE)

DATE PRESENTED TO SENATE: 9/21/96 [X] APPROVED [] NOT APPROVED

NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST (DATE): 9/30/96

SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE: [Signature] 9/30/96

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED _____

APPROVED: YES NO

IF NO, REASONS ARE AS FOLLOWS:

STUDENT CREDIT HOURS _____

FACULTY LOAD HOURS _____

EQUALIZED CREDIT HOURS _____

OFFICIAL COPY & APPROVAL SHEET FILED (DATE) _____

SIGNATURE, EXECUTIVE VICE PRESIDENT/PROVOST *[Signature]*

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED 14 Mar 97

HEGIS TAXONOMY AND COURSE NUMBER ASSIGNED 0906-461

DATE/SIGNATURE OF REGISTRAR B. J. Kelly

NOTIFICATION FORWARD:

SENATE CURRICULUM COMMITTEE CHAIRPERSON

DEPARTMENT CHAIRPERSON(S)

ACADEMIC DEAN(S)

REGISTRAR

SPONSOR(S)

*Course Proposal***1. Details:**

- a) Course Title:** Transport Phenomena
b) Sponsor: School of Engineering Curriculum Committee
 Dr. C. Stewart Slater, Chemical Engineering
c) Credit Hours: 3 credit hours
d) Course Level: Senior (0906.461)
e) Curricular Effect: Technical Elective for Chemical Engineering majors
f) Prerequisites: Separation Processes, Reaction Engineering
g) Suggested Time/
Scale of Implementation: Spring 2000
 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 part of the Engineering Curriculum Proposal approved by the College Senate in December 1994. The proposed course is consistent with the establishment of the School of Engineering approved by the Board of Trustees in February 1995.

The proposed course fulfills Engineering Topics credit requirements for Chemical Engineering Programs as set forth by the Education and Accreditation Committee (EAC) of the American Institute of Chemical Engineers (AIChE) for accreditation of the program by the Accreditation Board for Engineering and Technology (ABET).

This course will provide the advanced concepts necessary for students in the Chemical Engineering Program to understand the unifying nature of momentum, heat and mass transfer. This elective is important for students planning to continue their studies to the doctoral level.

3. Essence of the Course:**a) Objectives:**

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

1. Understand the unifying nature of momentum, heat, and mass transfer.
2. Write shell balances on physical phenomena in terms of physicochemical properties.
3. Apply and solve detailed equations of continuity and motion to various processes.

4. Apply computer methods the solution of transport phenomena problems.
5. Write and analyze steady state and unsteady state equations for combined transport processes.
6. Understand how to model combined reactive processes.
7. Work in groups to analyze open-ended design problems.
8. Understand the operational parameters of several selected combined mode transfer operations such as a climbing film evaporator.

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 transport phenomena

 Unifying nature of momentum, heat, and mass transport

Viscosity, thermal conductivity, and diffusivity

Shell momentum balances and boundary conditions

Equations of continuity and motion

Typical steady-state momentum transport problems

Shell energy balances and energy transport equations

Solution of steady state conduction and convection problems using dimensionless variables

Unsteady state momentum and energy transport problems

 Combination of variable solutions

 Error function solutions

Shell mass balances and mass transport equations

Solutions of steady state mass transport problems

Analysis of mass transfer coupled with heat transfer and/or chemical reaction

A computer homework/project will involve methods for solution of steady-state two dimensional energy transport problem. Solution required using analytical, numerical, and Monte Carlo techniques. A laboratory exercise may be utilized as one of the homework assignments.

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 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:

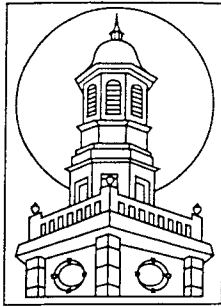
The proposed course is part of the Engineering Curriculum Proposal approved by the Faculty Senate in December 1994. Consultations were submitted with original proposal as specified by the Curriculum Committee. Consultations have been made with Chemistry faculty in the Department of Chemistry and Physics who have provided a letter of support.

Catalog Description

Transport Phenomena (0906.461)

(Prerequisites: Separation Processes, Reaction Engineering)

This course describes analogies among heat, mass, and momentum transfer. Governing differential equations are presented and their uses in steady-state and unsteady-state systems. This course reviews applications to mass transfer coupled with heat transfer and/or chemical reaction. Numerical methods and computer applications are included.



Rowan College of New Jersey

Glassboro, NJ 08028-1701 • 609/256-4855

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