

ROWAN COLLEGE
CURRICULUM COMMITTEE

ROPOSAL TITLE: Transfer Processes (2)

UNDERGRADUATE GRADUATE 3 CREDIT HOURS

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

DEPARTMENT & TELEPHONE# Chemical Engineering, x4631

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

STEP #1 (DEPARTMENT)	STEP #2 (RECEIPT)	STEP #3 (SCHOOL)
<p>APPROVED/DATE: _____</p> <p>NOT APPROVED/DATE: _____</p> <p style="text-align: center;"><u>N/A</u> DEPT. CURRICULUM CHR.</p> <p>REVIEWED/DATE: _____</p> <p style="text-align: center;"><u>N/A</u> DEPT. CHR.</p>	<p>SCC# <u>95-96-61</u></p> <p>DATE RECEIVED: _____</p> <p style="text-align: center;">SENATE</p> <p style="text-align: center;">OCT 23 1995</p> <p style="text-align: center;">RECEIVED <u>Ronald J. Fisher</u> SENATE CURRICULUM CHR.</p>	<p>REVIEWED DATE: <u>10-14-95</u></p> <p><input checked="" type="checkbox"/> RECOMMEND TO APPROVE</p> <p><input type="checkbox"/> RECOMMEND NOT TO APPROVE</p> <p style="text-align: center;">FORWARD FOR OPEN HEARING</p> <p><input checked="" type="checkbox"/> WITHOUT RESERVATIONS</p> <p><input type="checkbox"/> WITH RESERVATIONS</p> <p>COMMENTS: _____</p> <p style="text-align: center;"><u>[Signature]</u> SCHOOL COMMITTEE CHR.</p>

STEP #4 (ACADEMIC DEAN)	COMMENTS:
<p><input checked="" type="checkbox"/> RECOMMEND</p> <p><input type="checkbox"/> NOT RECOMMEND</p> <p><input type="checkbox"/> CONDITIONALLY RECOMMEND (SEE COMMENTS)</p> <p>DATE & SIGNATURE, DEAN OF SCHOOL _____</p>	<p>_____</p> <p style="text-align: center;"><u>[Signature]</u> <u>10/11/95</u></p>

STEP #5 (SENATE CURRICULUM COMMITTEE)
<p>DATE OF OPEN HEARING <u>10/31/95</u></p> <p>APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) <u>10/31/95</u></p> <p><input type="checkbox"/> RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:</p> <p>_____</p> <p>_____</p>

STEP #6 (SENATE)
<p>DATE PRESENTED TO SENATE <u>10/24/95</u> <input checked="" type="checkbox"/> APPROVED <input type="checkbox"/> NOT APPROVED</p> <p>NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST (DATE) _____</p> <p>SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE <u>Ronald J. Fisher</u> <u>10/24/95</u></p>

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED 12-4-95

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) 12/4/95

SIGNATURE, EXECUTIVE VICE PRESIDENT/PROVOST [Signature]

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED 10 Jan 96

HEGIS TAXONOMY AND COURSE NUMBER ASSIGNED 09061 309

DATE/SIGNATURE OF REGISTRAR B. Kibbey 10 Jan 96

NOTIFICATION FORWARD:

___ SENATE CURRICULUM COMMITTEE CHAIRPERSON

___ DEPARTMENT CHAIRPERSON(S)

___ ACADEMIC DEAN(S)

___ REGISTRAR

___ SPONSOR(S)

Course Proposal

1. Details:

- | | |
|--|--|
| a) Course Title: | Transfer Processes |
| b) Sponsor: | School of Engineering Curriculum Committee;
Dr. C. Stewart Slater, Chemical Engineering |
| c) Credit Hours: | 3 credit hours |
| d) Course Level: | Junior |
| e) Curricular Effect: | Core Elective |
| f) Prerequisites: | Fluid Mechanics, Engineering Analysis II or equivalent |
| g) Suggested Time/
Scale of Implementation: | Spring 1999
1 section each semester |
| h) Resources: | Faculty will be hired and equipment obtained
consistent with Engineering School multi-year plan.
Library acquisitions will be necessary. |

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 is a Core Requirement for Chemical Engineering and Mechanical Engineering and a Core Elective for Civil/Environmental and Electrical Engineering. The course is also a Chemical Engineering Program Criteria requirement of the Education and Accreditation Committee (EAC) of the American Institute of Chemical Engineers (AIChE) for accreditation of the Chemical Engineering program by the Accreditation Board for Engineering and Technology (ABET).

The course lays the foundation in the transfer processes of heat and mass transport and will serve several of the engineering disciplines. The course is vital to the Engineering School Core offerings and will provide students with an understanding of basic principles of heat and mass transfer and how they are interrelated.

3. Essence of the Course:

a) Objectives:

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

1. Understand the basic principles that govern transfer processes and the fundamentals of heat and mass transport.

2. Apply the basic principles of heat and mass transfer to design problems.
3. Understand the differences between the various modes of heat and mass transfer.
4. Apply the principles of heat and mass transfer to basic industrial processes.
5. 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 to transfer processes

General transfer equations for momentum, heat, mass transport

Principles of steady state heat transfer

Conduction and thermal conductivity

Convective heat transfer coefficient

Conduction heat transfer

Conduction through walls/slabs, cylinders, spheres

Conduction through multi-layer/composite geometries

Overall heat transfer coefficient

Numerical methods in steady state conduction

Forced convection heat transfer

Heat transfer coefficient in pipes; laminar and turbulent flows

Heat transfer coeff.; flow outside flat plate, cylinders/tubes, spheres

Natural convection heat transfer

Natural convection from various geometries

Boiling and condensation

Nucleate and film boiling

Film condensation - vertical and horizontal surfaces

Heat exchangers

Types of heat exchangers - double-pipe, shell and tube, cross-flow

Design parameters; effectiveness and overall coefficients

Radiant heat transfer

Simple radiation from object to surroundings

Combined radiation and convection
View factors in radiation from various geometries

Special considerations in heat transfer
Agitated vessels, extended surface or finned heat exchangers

Unsteady state heat transfer
Unsteady state conduction in various geometries -
semiinfinite solid, flat plate, cylinder
Numerical methods for unsteady state conduction analysis

Principles of Mass Transfer
Molecular diffusion in gases, liquids, solids
Diffusion coefficients for gases, liquid, solids
Numerical methods for steady state diffusion in two dimensions

Principles of unsteady state mass transfer
Basics of unsteady state diffusion
Numerical methods for unsteady state diffusion

Convective mass transfer coefficients
Types of mass transfer coefficients
Methods to determine mass transfer coefficients

Mass transfer coefficients for various geometries
Derivations of mass transfer coefficients for laminar flow
Mass transfer relations for flow inside pipes
Mass transfer relations for flow outside solid surfaces

Diffusion of gases in porous solids and capillaries
Knudsen and molecular diffusion of gases

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.

Catalog Description

Diffusion processes; conduction of heat, diffusion of mass and of chemical composition. Steady and unsteady state heat conduction, convective heat transfer; radiant transfer; boiling and condensation; heat exchanging. Mass transfer analysis; molecular diffusion in gases, liquids and solids and convective mass transfer. Demonstrations and laboratories will be integrated throughout the course.

Prerequisites: Fluid Mechanics, Engineering Analysis II or equivalent