

ROWAN UNIVERSITY CURRICULUM PROPOSAL

2

PROPOSAL TITLE:
Process Fluid Transport (0906. 309)

CHECK APPROPRIATE: UNDERGRADUATE GRADUATE 2 SEMESTER HOURS

SPONSOR(S): Dr. C. Stewart Slater and Chemical Engineering Curriculum Committee

DEPARTMENT/TELEPHONE # Chemical Engineering x4631

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

<p>Step #1 (Department)</p> <p><input checked="" type="checkbox"/> Approved (Date) <u>10-20-97</u></p> <p><input type="checkbox"/> Not Approved (Date)</p> <p><u>[Signature]</u> Dept. Curriculum Chr.</p> <p><u>10-20-97</u> Reviewed (Date)</p> <p><u>[Signature]</u> Dept. Chr.</p>	<p>Step #2 (Receipt)</p> <p>SCC# <u>97-98-71</u></p> <p><u>10-21-97</u> Date Received Senate</p> <p>_____ Senate Curriculum Chr.</p>	<p>Step #3 (School)</p> <p>Reviewed Date: <u>10-20-97</u></p> <p><input checked="" type="checkbox"/> Recommend to Approved</p> <p><input type="checkbox"/> Recommend NOT to Approve</p> <p>Forward for Open Hearing:</p> <p><input checked="" type="checkbox"/> WITHOUT Reservations</p> <p><input type="checkbox"/> WITH Reservations:</p> <p>Comments:</p> <p><u>[Signature]</u> School Committee Chr.</p>
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Step #4 (Academic Dean): Recommended NOT Recommended Conditionally Recommended (See Comments)

Comments:

Dean Signature/Date [Signature] 10-27-97

Step #5 (Senate Curriculum Committee): Open Hearing Date: 11-4-97 Approved by Curriculum Committee Date 11-4-97

Returned to Sponsor(s) for the following reason:

Step #6 (Senate) Date announced/voted on at Senate _____ If voted on: Approved NOT Approved

Date forwarded to Executive Vice President/Provost _____

Senate Curriculum Committee chair Signature/Date: _____

Step #7 (Executive Vice President/Provost): Date Received 1/23/98

Approved

NOT Approved If no, reasons are as follows:

Student Credit Hours 2

Faculty Load Hours 2

Qualified Credit Hours _____

Official Copy & Approval Sheet Filed (Date)

Executive Vice President/Provost Signature

Carol J. Matteson

Registrar

Date Approved Course Description Received

8 Jan 98

Regis Taxonomy and Course Number Assigned

0400:309

Date/Signature of Registrar

B + K L King

Notification Forward:

Senate Curriculum Committee Chairperson

Department Chairpersons

Academic Dean(s)

Registrar

Sponsor(s)

*Transmittal
1/23/98*

Course Proposal

1. Details:

a) Course Title:	Process Fluid Transport (0906.309)
b) Sponsor:	Dr. C. Stewart Slater, Chemical Engineering
c) Credit Hours:	2 credit hours
d) Course Level:	Junior
e) Curricular Effect:	Requirement for Chemical Engineering students
f) Prerequisites:	Fluid Mechanics I, Chemical Process Principles I & II
g) Suggested Time/ Scale of Implementation:	Fall 1998 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 requirement 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 proposed course is part of the Chemical Engineering Program and meets requirements of the Education and Accreditation Committee (EAC) of the American Institute of Chemical Engineers (AIChE) for accreditation of programs by the Accreditation Board for Engineering and Technology (ABET).

The course will introduce students to topics in fluid and momentum transport related to chemical processes. Students will investigate the topics of momentum and fluid transport, not covered in the 2 s.h. introductory course, Fluid Mechanics I. This course will provide the needed principles for students to succeed in Transfer Processes and Chemical Process Component Design.

3. Essence of the Course:

a) Objectives:

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

1. Understand complex flow behavior of various chemical process systems.
2. Determine the important parameters related to two phase flow
3. Understand the implications of Newtonian and non-Newtonian fluids characteristics on process design.

4. Understand the design parameters of various types of pumps and compressors and be able to generate and apply a pump performance curve.
5. Apply the theory and design of packed bed column operation to a chemical process application.
6. Differentiate between packed bed performance and fluidized bed performance criteria.
7. Design a mixing vessel based on various impeller/fluid parameters.
8. Use computer software (from CACHE and other sources) to analyze and design process fluid transfer processes.
9. Understand the impact of safety and environmental issues on process fluid processes.
10. 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.

Introduction to process fluid transport

Momentum balances, transport phenomena

Newtonian and non-Newtonian fluid behavior

Theoretical and practical considerations

Two-phase flow in chemical processing

Liquids and gases

Gases and solids

Liquids and solids

Flow through beds of solids in chemical processing

Fixed beds of granular solids

Tower packings

Fluidized beds

Porous media

Special considerations

Fluid distribution

Flow around objects

Particle dynamics

Entrainment of liquid films

Falling films

Bubble and droplet behavior

Pumping of liquids and gases in chemical processing

Centrifugal pumps

Positive displacement pumps
Compressors and fans
Pump design considerations, selection and cost

Mixing in chemical processing
Agitation of low-viscosity particle suspensions
Paste and viscous material mixing
Solid-solid mixing
Liquid-liquid mixing

Special topics in fluid transport in chemical processing

c) Evaluation and Grading Procedure of Students:

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

This course is neither a requirement or elective in any other program, and does not impact on required prerequisite course offerings of any other program. Therefore, no consultations have been sought.

Catalog Description

Process Fluid Transport (0906.309)

Prerequisite: Fluid Mechanics I, Principles of Chemical Processes I & II; Co-requisite: Transfer Processes I & II

The course will introduce students to topics in fluid and momentum transport related to chemical processes. Students will investigate the fundamental and design topics of momentum and fluid transport beyond those covered in Fluid Mechanics I. The topics area will be applied to various chemical processing applications. Topics will include Newtonian and non-Newtonian fluid behavior, two-phase flow, flow through beds of solids, pumping of liquids and gases, and mixing.