

(12)

ROWAN COLLEGE CURRICULUM COMMITTEE

0906-442

PROPOSAL TITLE: Fluid Flow in Processing and Manufacturing

X UNDERGRADUATE GRADUATE 3 CREDIT HOURS

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

DEPARTMENT & TELEPHONE# Chemical Engineering 24631

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

Table with 3 columns: STEP #1 (DEPARTMENT), STEP #2 (RECEIPT), STEP #3 (SCHOOL). Includes fields for APPROVED/DATE, SCC#, DATE RECEIVED, REVIEWED DATE, and various recommendation options.

STEP #4 (ACADEMIC DEAN) COMMENTS: RECOMMEND NOT RECOMMEND CONDITIONALLY RECOMMEND (SEE COMMENTS) DATE & SIGNATURE, DEAN OF SCHOOL J. Placey 2/16/96

STEP #5 (SENATE CURRICULUM COMMITTEE) DATE OF OPEN HEARING 9/23/96 APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) 9/23/96 RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:

STEP #6 (SENATE) DATE PRESENTED TO SENATE 9/25/96 APPROVED NOT APPROVED NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST (DATE) 9/28/96 SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE Ronald J. Gochen 9/28/96

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 0906-442

DATE/SIGNATURE OF REGISTRAR [Signature]

NOTIFICATION FORWARD:

SENATE CURRICULUM COMMITTEE CHAIRPERSON

DEPARTMENT CHAIRPERSON(S)

ACADEMIC DEAN(S)

REGISTRAR

SPONSOR(S)

Course Proposal**1. Details:**

- a) Course Title:** Fluid Flow in Processing and Manufacturing
b) Sponsor: School of Engineering Curriculum Committee;
 Dr. C. Stewart Slater, Chemical Engineering
c) Credit Hours: 3 credit hours
d) Course Level: Senior (0906.442)
e) Curricular Effect: Technical Elective for Chemical, Civil & Environ.,
 and Mechanical Engineering majors
f) Prerequisites: Fluid Mechanics
Suggested Time/ Fall 1999
Scale of Implementation: 1 section
h) Resources: Faculty will be hired 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 is Technical Elective for Chemical, Civil & Environmental, and Mechanical Engineering majors. It satisfies the Engineering Topics credit requirements 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 will address the advanced engineering aspects of fluid flow as related to chemical and other process industry applications. The foundation provided by the required course Fluid Mechanics will be expanded upon with more complex problems and industrial scenarios. The course will provide seniors and graduate students with advanced mathematical techniques to analyze complex fluid flow problems and examine important processes such as fluidization and multiphase transport and processing.

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

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

1. Analyze advanced fluid flow in processing / manufacturing industries.

2. Apply advanced concepts of fluid mechanics to complex flow problems.
3. Analyze and design multiphase fluidized bed systems.
4. Analyze and design single and multiphase mixing systems.
5. Use computer software to analyze multiphase fluid flow problems.
6. 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.

Fluid flow applications

- Processing and manufacturing industries
- Commercial development trends
- Materials transport / transport alternatives

Advanced flow concepts

- Single and multiphase flow
- Creeping flow
- Lubrication
- Turbulence
- Perturbation and numerical solution
- Viscoelasticity

Gas-solid fluidized bed systems

- Phase diagrams
- Equipment types
- Fluidization parameters

Design of fluidized bed systems

- Fluidization vessels
- Experimentation and scale-up
- Temperature effects and control
- Solid and gas mixing
- Size enlargement and reduction
- Solids feeders and solids flow control
- Industrial applications of fluidized beds

Mixing technologies: liquid-liquid systems

- Mixer-settler equipment
- Flow or in-line mixers
- Mixing in agitated vessels

Mixing technologies: liquid-solid systems

- Mixing equipment
- Fluid behavior in mixing vessels
- Design of agitation equipment
- Dispersion and uniformity of mixing
- Solids suspensions

Mixing technologies: paste and viscous materials

- Batch mixers
- Continuous mixers
- Process design considerations

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:

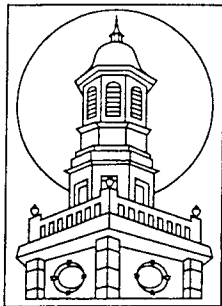
The proposed course is part of the Engineering Curriculum Proposal approved by the Faculty Senate in December 1994. Consultations were submitted with original proposal as specified by the Curriculum Committee. Consultations have been made with Chemistry faculty in the Department of Chemistry and Physics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

Catalog Description

Fluid Flow in Processing and Manufacturing (0906.442)

(Prerequisite: Fluid Mechanics)

This course surveys fluid flow applications in the processing and manufacturing industries. It presents advanced flow concepts; multiphase flow, complex flow, and turbulence. Gas-solid fluidized bed technology and design are also presented. This course will analyze liquid-liquid and liquid-solid mixing systems.



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