

ROWAN COLLEGE  
CURRICULUM COMMITTEE

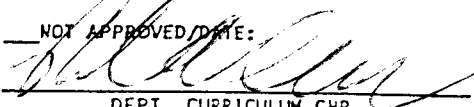

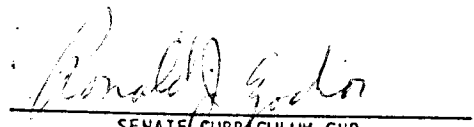
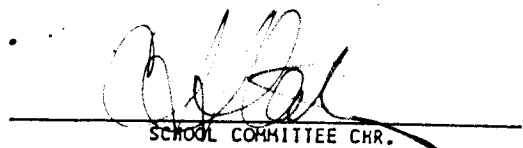
PROPOSAL TITLE: PHYSICOCHEMICAL UNIT PROCESSES 908-512

     UNDERGRADUATE                      XX GRADUATE                        3   CREDIT HOURS

SPONSOR(S): DR. RALPH ALAN DUSSEAU, P.E. and THE SCHOOL OF ENGINEERING CURRICULUM COMMITTEE


DEPARTMENT & TELEPHONE# CIVIL ENGINEERING Ext. 4628

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

STEP #1 (DEPARTMENT)	STEP #2 (RECEIPT)	STEP #3 (SCHOOL)
<input checked="" type="checkbox"/> APPROVED/DATE: <u>9/23/96</u> <input type="checkbox"/> NOT APPROVED/DATE: _____  DEPT. CURRICULUM CHR. Ralph Alan Dusseau <input checked="" type="checkbox"/> REVIEWED/DATE: <u>9/23/96</u>  Ralph Alan Dusseau DEPT. CHR.	SCC# <u>96-97-48</u> DATE RECEIVED: _____  Ronald Godon SENATE/CURRICULUM CHR.	REVIEWED DATE: <u>9/27/96</u> <input checked="" type="checkbox"/> RECOMMEND TO APPROVE <input type="checkbox"/> RECOMMEND NOT TO APPROVE FORWARD FOR OPEN HEARING <input checked="" type="checkbox"/> WITHOUT RESERVATIONS <input type="checkbox"/> WITH RESERVATIONS COMMENTS:  SCHOOL COMMITTEE CHR.

STEP #4 (ACADEMIC DEAN)                      COMMENTS:

RECOMMEND  
 NOT RECOMMEND  
 CONDITIONALLY RECOMMEND (SEE COMMENTS)

DATE & SIGNATURE, DEAN OF SCHOOL: 9/27/96  


STEP #5 (SENATE CURRICULUM COMMITTEE)

DATE OF OPEN HEARING 3-5-97

APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) 3/5/97

RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:

\_\_\_\_\_

\_\_\_\_\_

STEP #6 (SENATE)

DATE PRESENTED TO SENATE 5-6-97                       APPROVED                       NOT APPROVED

NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST, (DATE) \_\_\_\_\_

SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE Edward J. ...

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED Mar 27 1997

APPROVED:      YES      NO

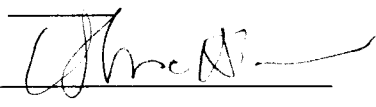
IF NO, REASONS ARE AS FOLLOWS:

STUDENT CREDIT HOURS     

FACULTY LOAD HOURS     

EQUALIZED CREDIT HOURS     

OFFICIAL COPY & APPROVAL SHEET FILED (DATE)     

SIGNATURE, EXECUTIVE VICE PRESIDENT/PROVOST 

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED 4 June 97

REGIS TAXONOMY AND COURSE NUMBER ASSIGNED 6908-512

DATE/SIGNATURE OF REGISTRAR B. F. Kelsey

NOTIFICATION FORWARD:

     SENATE CURRICULUM COMMITTEE CHAIRPERSON

     DEPARTMENT CHAIRPERSON(S)

     ACADEMIC DEAN(S)

     REGISTRAR

     SPONSOR(S)

Course Proposal:

1. Details:

- a) Course Title: Physicochemical Unit Processes
- b) Sponsor: Dr. Ralph Alan Dusseau and the School of Engineering Curriculum Committee
- c) Credit Hours: 3 credit hours
- d) Course Level: Graduate (0908.512)
- e) Curricular Effect: Elective course for graduate civil engineering students
- f) Prerequisites: Wastewater Treatment
- g) Suggested Times/  
Scale of Implementation: One section every other spring semester
- h) Resources:

Faculty: Existing faculty will teach this course.

Library: Library acquisitions will be required.

Equipment: Laboratory space and appropriate experimental equipment for water treatment testing, treatment, and design will be required.

Computers: Computer laboratory space and appropriate environmental engineering analysis and design software will be required.

2. Rationale:

The proposed course is the revised version of a course entitled "Advanced Environmental Engineering II" which was part of the Engineering Curriculum that was 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 fundamental theme of the course is the study of advanced topics in physicochemical processes like coagulation, flocculation, sedimentation, filtration, disinfection, oxidation,

adsorption and membrane processes.

### 3. Essence of the Course:

#### a) Objectives:

Upon completion of the course, civil engineering students will be able to do the following:

Understand and apply principles in several advanced areas of physicochemical unit processes including:

- Coagulation/flocculation
- Sedimentation
- Softening
- Filtration
- Adsorption
- Ion exchange
- Membrane processes
- Gas transfer
- Disinfection
- Corrosion.

#### b) Topical Outline:

The instructor will supply the students with a syllabus during the first week of classes. The instructor will assess any engineering technology advances and make necessary topic changes as deemed appropriate to maintain the standards of the course. The topics to be covered are listed below:

Introduction to Physical, Chemical and Biological Characteristics of Water

#### Coagulation/Flocculation:

- Colloidal Suspensions
- Nature of Colloids
- Colloid Stability
- Coagulants
- Types of Flocculation
- Flocculation Devices
- Process Kinetics and Reactor Design

#### Sedimentation:

- Types of Sedimentation
- Reactor Design and Process Kinetics

#### Softening:

- Types of Hardness

Various Types of Softening  
Recarbonation  
Caldwell-Lawrence Diagrams

Filtration:

Types of Filter and Filter Media  
Mechanism of Filtration  
Backwashing

Adsorption:

Types of Adsorption  
Adsorption Models  
Isotherms  
Adsorption Systems: Batch and Continuous  
Factors Affecting Adsorption

Ion Exchange:

Applications  
Ion Exchange Resins  
Synthetic and Natural Resins  
Process Kinetics  
Design of Batch, Column and Fluidized Bed Reactors

Membrane Processes:

Membrane Properties  
Osmotic Pressure  
Mechanism of Osmosis  
Water and Solute Diffusion  
Flux Relationships  
Power and Energy Requirements

Gas Transfer:

Fundamentals of Gas Transfer  
Mass Transfer  
Air Stripping  
Design of Air-stripping Towers

Disinfection:

Waterborne Diseases  
Physical/Chemical Disinfection Processes  
Mechanism of Disinfection  
Process Kinetics

Corrosion:

Theory  
Corrosion Reactions and Kinetics  
Corrosion Control

c) Evaluation and Grading Procedure of Students:

Student grades will be based on team problems, team projects, team lab reports, individual examinations, and individual homework.

d) Course Evaluation:

The proposed course will be evaluated based on student evaluations and curriculum review by engineering faculty.

4. Results of Consultations:

The proposed course is part of the Engineering Curriculum Proposal approved by the College Senate in December 1994. Consultations were submitted with the original proposal as specified by the Curriculum Committee.

Additional consultations were sought from the Biological Sciences Department and the Department of Chemistry and Physics. A letter of consultation was received from the Biological Sciences Department.

Catalog Description:

Physicochemical Unit Processes (0908.512)

(Prerequisites: Wastewater Treatment)

The course deals with the principles of physicochemical unit processes including advanced topics in the theory, design and operation for various physicochemical unit processes. The course includes appropriate laboratory experiments and computer applications.

# ROWAN

Biological Sciences Department

Phone: (609) 256-4833

Fax: (609) 256-4921

*TO: Dr. R. A. Dusseau, Chairperson  
Environmental Engineering*

*FROM: Biological Sciences Department*

*RE: Environmental Engineering Course Proposal*

*DATE: November 15, 1996*

*The Biological Sciences Department in its review of the six course proposals for the Environmental Engineering program, offers the following comments or concerns.*

*The department supports all six proposals, however most of these courses have a strong biological component, therefore we believe students should have Biology I and Microbiology as prerequisites.*

*Also we believe the engineering courses must be team-taught and that the biology component taught by a member of the Biology Department. The environmental field is an interdisciplinary one, and our department has the experts to integrate with engineering in this particular area. We would like to see a more active participation between the two departments.*

*All of these courses could be beneficial to Biology majors in the Ecology/ Environmental track. The graduate courses in Environmental Engineering would be especially appealing to students when the Biological Sciences Department develop the Master Program in Environmental Sciences. Therefore, we propose that these courses be taken with "or approval of instructor."*

*cc: P. Bartelt*