

K O W A N C O L L E G E
C U R R I C U L U M C O M M I T T E E

(P)

PROPOSAL TITLE: PHYSICOCHEMICAL UNIT PROCESSES FOR SENIORS

0908-412

UNDERGRADUATE


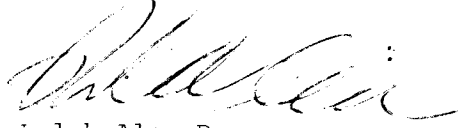
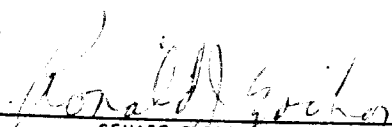

GRADUATE

3 CREDIT HOURS

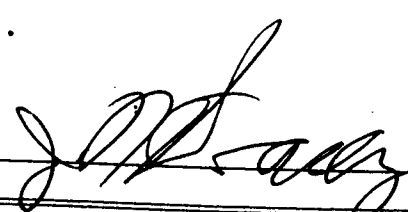
SPONSOR(S): DR. RALPH ALAN DUSSEAU, P.E. and THE SCHOOL OF ENGINEERING CURRICULUM COMMITTEE

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>910-47-45</u> DATE RECEIVED: _____  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

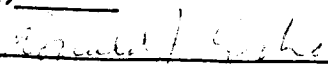
APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) 3/5/97

RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:

STEP #6 (SENATE)

DATE PRESENTED TO SENATE 2/10/97 APPROVED NOT APPROVED

NOTIFICATION TO EXECUTIVE VICE PRESIDENT/PROVOST. (DATE) _____

SENATE CURRICULUM COMMITTEE CHAIR SIGNATURE/DATE:  3/5/97

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED MA 1 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 [Signature]

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED 4 June 97

REGIS TAXONOMY AND COURSE NUMBER ASSIGNED 0908-412

DATE/SIGNATURE OF REGISTRAR B. J. Kelley

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 for Seniors
- b) Sponsor: Dr. Ralph Alan Dusseau and the School of Engineering Curriculum Committee
- c) Credit Hours: 3 credit hours
- d) Course Level: Seniors (0908.412)
- e) Curricular Effect: Elective course for civil engineering students in the environmental emphasis.
- 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 for Seniors (0908.412)

(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
(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