PROPOSAL SCC #00-01 401

CURRICULUM PROPOSAL FORM 2000-2001

NON-GENERAL EDUCATION PROCESS A

***DEADLINES: Deadline dates for 2000/2001 submissions: Regular proposals: October 20, 2000 to be implemented in Fall 2001; Short-Term proposals: December 8, 2000 to be implemented in Fall, 2001; Regular proposals February 16, 2001 to be implemented in Spring, 2002; March 23, 2000 for short-term courses to be implemented in Spring 2002.**

PROPOSAL TITLE:

SPONSOR(S):

DEPARTMENT:

COLLEGE:

IF LAS CHECK ONE: ___ **History/Humanities** ___**Math/Sciences** ___**Social/Behavioral Sciences**

Check one: ____**Undergraduate** ____**Graduate**

THE ATTACHED ***NON-GEN-ED*** PROPOSAL IS BEST DESCRIBED BY THE ITEM(S) CHECKED.

___New non-gen-ed course

____Short-term non-gen-ed course

____Minor curricular changes (fewer than three) to:

_____existing non-gen-ed course

_____non-gen-ed degree requirements

_____major

_____ minor, specialization, concentration, track, certificate program

DEPARTMENT
(Signature indicates approval)

Dept. Curriculum Chair / Date

Dept. Chairperson / Date 10/26/00

ACADEMIC DEAN

Approved ✓ Not Approved _____ Comments:

Dean's Signature/Date Dianne Dorland 10/26/00

RECEIVED
ROWAN UNIVERSITY SENATE

COLLEGE CURRICULUM COMMITTEE

Date of open hearing (if necessary) 2/20/02 Approved ✓ Not Approved _____
Comments:

Signature of College Chair/Date: [signature] 2/20/02

UNIVERSITY CURRICULUM COMMITTEE

Date Received/Processed 2/25/02 See Attached Letter of Consultation
Comments: Envtl. Sciences Dept. remains neutral on proposal - not opposed.
Biol. Sciences considers at undergrad level; this proposed at GRAD level.
Curriculum Committee Chair Signature [signature] Date Announced At Senate 4/15/02

EXECUTIVE VICE PRESIDENT/PROVOST

Approved ✓ Not Approved _____ If no, reasons are as follows:

Student Credit Hours _____ Faculty Load Hours _____ Equalized Credit Hours _____

Official Copy & Approval Sheet Filed (Date): _____ Executive VP/Provost Signature/Date [signature] 2/22/02

REGISTRAR

Date Approved Course Description Received _____ Hegis Taxonomy & Course Number Assigned [illegible]

Registrar Signature/Date [signature] 2/26/02

NOTIFICATION FORWARD

✓ Senate Curriculum Committee Chairperson ✓ Academic Dean(s) [signature] 3/6/02

✓ Department Chairpersons ✓ Registrar _____ Sponsor(s)

Course Proposal

1. Details:

a) Course Title:	Engineering Exercise Dynamics (0906.583)
b) Sponsor:	Co-sponsored by the Departments of Chemical Engineering and Health and Exercise Science; Faculty sponsors Stephanie Farrell (Chemical Engineering) and Edward C. Chaloupka (Health and Exercise Science); Chemical Engineering Curriculum Committee.
c) Credit Hours:	4 credit hours
d) Course Level:	Graduate
e) Curricular Effect:	Technical elective for engineering graduate courses
f) Prerequisites:	Graduate standing and approval of graduate advisor
g) Suggested Time/ Scale of Implementation:	Spring 2003 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 / Health and Exercise Science budgets. Library acquisitions will be required consistent with current acquisition plan.

2. Rationale:

This course is a joint proposal between the College of Engineering and the Department of Health and Exercise Science. The course will be team-taught by faculty of Chemical Engineering and Health and Exercise Science. The course is project-intensive, and involves several laboratory experiments, and a total of 4 credit hours will be assigned for this course.

The course will address the analysis of exercise science and engineering systems, which include important multidisciplinary topics relevant to many areas of engineering. The course will describe the advanced principles of exercise processes from an engineering perspective. Topics will include material and energy balances, pumps and valves, reactions, fluid flow, gas separations, and physical work capacity applied to exercise processes. Mathematical modeling of the engineering operations will be emphasized. The interrelationships of these systems and their role in response to exercise will be studied.

3. Essence of the Course:

a) Objectives:

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

1. Apply principles of thermodynamics, chemical reactions, mass transfer, and fluid flow as applied to exercise process dynamics.
2. Model and simulate dynamic exercise processes in normal and stress environments.
3. Analyze the exercise processes from an engineering perspective.
4. Use computer software to analyze exercise-related engineering problems.
5. Work in teams to solve open-ended design problems.

b) Topical Outline:

The topics to be covered are listed below. The instructors will supply the students with a syllabus during the first week of classes. The instructors 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 exercise physiology
- Nutrition
- Energy transfer
- Metabolism
- Cardiovascular system

Energy Expenditure
- Chemical Reactions
- Energy Balances
- Mechanical work
- Mechanical efficiency

The Respiratory System
- Gas exchange and membrane separations
- Mass balances
- Oxygen transport
- Carbon dioxide transport
- Solubility and Dissociation
- Mass transfer resistance
- Process control applications
- Pulmonary Mechanics
- Fluid Mechanics in the airways
- Work of breathing

The Cardiovascular System
- Heart function
- Energy Balances
- Bernoulli Principle
- Mechanical work of the heart
- Pressure effects in blood flow

Viscosity and rheology in blood flow
Process control applications
Process Control applied to blood flow regulation
Mechanical operation of the heart

Heat Transfer and Thermodynamics
Heat transfer mechanisms: conduction, convection, radiation, and evaporation
Heat transfer and energy balances within the body
Positive and Negative Work

c) Laboratory Experiments

This course is laboratory-intensive. 3 ½ hours of meeting time per week will be necessary to accommodate the classroom topic and laboratory schedule. The laboratory experiments that will be performed in this course are listed below.

1. Equipment calibration
2. Open circuit spirometry
3. Basal metabolic rate
4. Maximal oxygen consumption
5. Blood lactic acid
6. Aerobic exercise
7. Anaerobic exercise
8. Lung volumes and pulmonary mechanics
9. Respiration during exercise
10. Cardiac output at rest and during exercise
11. Blood pressure at rest and during exercise

d) Evaluation and Grading Procedure of Students:

Student grades will be based on examinations and homework as well as both team and individual projects. A course syllabus with a stated method of arriving to the final grade, e.g., number of exams, projects, homework, percentage of grade, will be distributed to students the first week of classes.

e) 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. The Department of Biological Sciences has been consulted.

Catalog Description

Engineering Exercise Dynamics (0906.583)

Prerequisite: Graduate standing and approval of Graduate Advisor

In this course students explore the dynamics of exercise physiology using engineering principles. The biochemistry and physiology required for understanding these systems is reviewed. Advanced principles of mass transfer, heat transfer, fluid flow, thermodynamics,and chemical reaction are used to analyze the human metabolic system, respiratory system, cardiovascular system, and thermal system. The interrelationships of these systems will be investigated, and their dynamic response to exercise will be studied. Laboratory experiments will be conducted throughout the course. Original studies in engineering exercise dynamics will be pursued through a term project. This project will have experimental and analytical components as well as written and oral deliverables. This course is jointly taught with the Department of Health and Exercise Science.

ROWAN UNIVERSITY

TO: Dr. Stephanie Farrell, Chemical Engineering
Dr. Edward Chaloupka, Health & Exercise Science

FROM: Dr. Andrew Prieto, Chair, Biological Sciences

DATE: October 26, 2000

RE: New Course Proposal "Principles of Engineering and Exercise Physiology"

At a recent department meeting, the Biological Sciences Department faculty discussed the above cited course proposal which you are sponsoring.

We find the course to be exciting and innovative and strongly support the proposal. However, we also would like to point out that there is already an approved course in Work Physiology within the Biological Sciences curriculum (co-sponsored by Dr. Chaloupka) that is very similar to the new proposal.

Our department has at least two individuals with expertise in this area and would welcome the opportunity to also team teach this course sometime in the future.

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