ROWAN COLLEGE
CURRICULUM COMMITTEE

PROPOSAL TITLE: Vibrations 0410-2-01

X UNDERGRADUATE ___GRADUATE _____CREDIT HOURS

SPONSOR(S): Tirupathi R. Chandrupatla

DEPARTMENT & TELEPHONE# Mechanical Engineering, 4632

CHECK ONE: X COURSE ___MINOR PROGRAM ___CONCENTRATION ___SPECIALIZATION

___ACHIEVEMENT CERTIFICATE ___CERTIFICATION PROGRAM ___MAJOR PROGRAM

STEP #1 (DEPARTMENT)

X APPROVED/DATE: 12-10-96

___NOT APPROVED/DATE:

DEPT. CURRICULUM CHR.

X REVIEWED/DATE:

T R Chandrupatla
DEPT. CHR.

STEP #2 (RECEIPT)

SCC# 96-97-88

DATE RECEIVED: 12-16-96

Ronald J. Gordon
SENATE CURRICULUM CHR.

STEP #3 (SCHOOL)

REVIEWED DATE:- 12-10-96

X RECOMMEND TO APPROVE

___RECOMMEND NOT TO APPROVE

FORWARD FOR OPEN HEARING

X WITHOUT RESERVATIONS

___WITH RESERVATIONS

COMMENTS:

SCHOOL COMMITTEE CHR.

STEP #4 (ACADEMIC DEAN)

X RECOMMEND

___NOT RECOMMEND

___CONDITIONALLY RECOMMEND
(SEE COMMENTS)

DATE & SIGNATURE, DEAN OF SCHOOL J. D. Stacy 12/10/96

COMMENTS:

STEP #5 (SENATE CURRICULUM COMMITTEE)

DATE OF OPEN HEARING _____

APPROVED BY SENATE CURRICULUM COMMITTEE (DATE) 1/29/97

___RETURNED TO SPONSOR(S) FOR THE FOLLOWING REASONS:

SENATE)

TO SENATE 1/29/97 X APPROVED ___NOT APPROVED

EXECUTIVE VICE PRESIDENT/PROVOST (DATE)

CULUM COMMITTEE CHAIR SIGNATURE/DATE Ronald J. Gordon 2/15/97

STEP #7 (EXECUTIVE VICE PRESIDENT/PROVOST)

DATE RECEIVED 2/9/97

APPROVED: ___YES ___NO

IF NO, REASONS ARE AS FOLLOWS:

STUDENT CREDIT HOURS 2

FACULTY LOAD HOURS 2

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 0910.241

DATE/SIGNATURE OF REGISTRAR 3-7-97 [signature]

NOTIFICATION FORWARD:

___SENATE CURRICULUM COMMITTEE CHAIRPERSON

___DEPARTMENT CHAIRPERSON(S)

___ACADEMIC DEAN(S)

___REGISTRAR

___SPONSOR(S)

Course Proposal

1. Details:

a) Course Title:	Vibrations
b) Sponsor:	Dr. Tirupathi R. Chandrupatla and School of Engineering Curriculum Committee
c) Credit Hours:	2 credit hours
d) Course Level:	Sophomore for Mechanical Engineering
e) Curricular Effect:	Required course for mechanical engineering majors
f) Prerequisites:	Physics I, Statics, Dynamics
g) Suggested Time/ Scale of Implementation	Spring 1998 One section
h) Resources:	Faculty will be hired and equipment will be obtained consistent with approved School of Engineering development plans and budget. Computing resources will be required consistent with approved School of Engineering budget. No software beyond what is currently networked will be required. Library resources above and beyond those needed to teach the course may be supplemented by instructors.

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 a core requirement for Mechanical Engineering discipline. The proposed course meets the Engineering Topics requirement of the Accreditation Board for Engineering and Technology (ABET) for engineering programs.

Knowledge of the dynamic behavior of elastic bodies and structures is necessary for modeling and designing them. This course is a prerequisite for the course on mechanical system dynamics.

3. Essence of the Course:

a) Objectives:

Upon completion of the course, students will be able to

1. Understand, formulate and model simple structural elements and determine

their natural frequencies.

2. Understand and model damped vibratory motion of simple structural elements.

3. Understand and formulate and use computer to solve forced vibrations of damped structural members.

4. Apply lumped mass techniques for solving continuous problems.

5. Apply basic computer software to solve vibration problems.

6. Conduct simple vibration experiments.

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 deemed to be appropriate to maintain the level and currency of instruction.

Introduction to vibrations
- Mass-spring systems
- Degrees of freedom
- Free vibrations of single degree of freedom systems
- Damping
- Free vibrations with damping

Forced vibrations of single degree of freedom systems
- Forced undamped vibration
- Resonance and beating
- Forced vibration of damped systems
- Rotating unbalance
- Measuring instruments
- Experimental methods for vibration and damping evaluation

Response to nonharmonic forces
- Periodic forcing functions
- Fourier series
- Determination of Fourier coefficients
- Vibration under periodic forcing functions
- Response to arbitrary forcing functions
- Computer methods and FFT analysis

Two degree of freedom systems
- Free undamped vibrations
- Matrix equations
- Damped free vibrations
- Undamped forced vibrations
- Forced vibration of damped systems
- Vibrations absorbers

Multi-degree of freedom systems
- Free vibration of multidegree of freedom systems
- Properties of natural frequencies and mode shapes
- Discrete approximation of continuous systems

c) Evaluation and Grading Procedure of Students:

Student grades will be determined on the basis of examinations, homework and/or projects, laboratory projects and reports. A course syllabus with stated method of arriving at the final grade, e.g., number of exams, projects homework, percentage of grade, will be distributed to the students during 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.

Catalog Description:

Vibrations (0910.201)
Prerequisites: Physics, Statics, Dynamics

The course deals with vibration of single and multi-degree of freedom systems. First free vibration of single degree of freedom spring-mass system is formulated and developed. Concepts of damping, and forced vibrations, and dynamic balancing are then introduced. Two degree of freedom systems are then considered to introduce the matrix system of equations. Multi-degree of freedom systems and modeling of continuous systems are presented. Fourier analysis for general forms of forced vibrations are discussed. Experimental experience will be integrated throughout the course.