PROPOSAL NUMBER: 99- 403

CURRICULUM PROPOSAL FORM

(SCC #99-307)

*DEADLINES:
REGULAR COURSE PROPOSALS: OCTOBER 23, 1998 FOR FALL, 1999 AND FEBRUARY 19, 1999 FOR SPRING, 2000
SHORT-TERM COURSE PROPOSALS: DECEMBER 11, 1998 FOR FALL, 1999 AND MARCH 26, 1998 FOR SPRING 2000

PROPOSAL TITLE: Quality and Reliability in Design and Manufacture

SPONSOR/S: Tirupathi R. Chandrupatla and Mechanical Engineering Curriculum Committee

DEPARTMENT: Mechanical Engineering

0910.342

CHECK ALL THAT APPLY:
X UNDERGRADUATE _____ GRADUATE

COLLEGE: Engineering
If LAS: _____ History/Humanities
_____ Math/Sciences
_____ Social/Behavioral Sciences

* * * * * * * * * * *

TYPE OF PROPOSAL *(Check ALL that Apply)*

_____ General Education
___ *New Course in* _____ *Bank*
___ *Existing course, Add To* _____ *Bank*
___ *Multicultural/Global Designation*
___ *Writing Intensive Designation*

_____ New Minor/Concentration/Specialization
_____ New Major/Degree Program
_____ Short Term Course Proposal

X New Course (NOT Gen. Ed.)
_____ Name Change (Dept., School, Major)
_____ Changes in Degree Requirements
___ *Changes Involve Gen. Ed. requirements*

_____ Minor Changes to Existing Courses
____ *Course is NOT General Education*
____ *Course IS General Education*

See attached for signatures

DEPARTMENT
(SIGNATURE INDICATES APPROVAL)

DEPT. CURRICULUM CHAIR / DATE

DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE
DATE OF OPEN HEARING (if necessary) 11/5/98
X APPROVED
— NOT APPROVED
COMMENTS:

Pitet F. Heffath 11/5/98
SIGNATURE DATE

ACADEMIC DEAN (& GRADUATE DEAN, for New Graduate Programs Only)
— APPROVED
— NOT APPROVED
COMMENTS: See attached

SIGNATURE (Academic Dean) DATE

SIGNATURE (Graduate Dean) DATE

UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) College Level only

— APPROVED

— NOT APPROVED

COMMENTS:

R. Reeves 11/6/98

SIGNATURE **DATE**

SENATE

Date announced at Senate 11/6/98

Voted upon at Senate: **Approved** **Not Approved** **Date:**

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): _____

DATE/SIGNATURE EXECUTIVE VICE PRESIDENT/PROVOST

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED 11/9/98

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED _____

DATE/SIGNATURE OF REGISTRAR

NOTIFICATION FORWARD:

_____**SENATE CURRICULUM COMMITTEE CHAIRPERSON**

_____**DEPARTMENT CHAIRPERSONS**

_____**ACADEMIC DEAN(S)**

_____**REGISTRAR**

SPONSOR(S)

ROWAN UNIVERSITY CURRICULUM PROPOSAL

C9/0.342

PROPOSAL TITLE:
Quality and Reliability in Design and Manufacture

CHECK APPROPRIATE: X UNDERGRADUATE ___ GRADUATE ___ SEMESTER HOURS

SPONSOR(S): Tirupathi R. Chandrupatla and Mechanical Engineering curriculum Committee

DEPARTMENT/TELEPHONE # 4632

CHECK ONE: X COURSE __MINOR PROGRAM __CONCENTRATION __SPECIALIZATION

__ACHIEVEMENT CERTIFICATE __CERTIFICATION PROGRAM __MAJOR PROGRAM

Step #1 (Department)

X Approved (Date) 2/20/98

___ Not Approved (Date)

Robert A
Dept. Curriculum Chr.

Reviewed (Date)

T R Chandrupatla
Dept. Chr.

Step #2 (Receipt)

SCC# 97-98-301

2-27-98
Date Received Senate

Senate Curriculum Chr.

Step #3 (School)

Reviewed Date: 2/20/98

X Recommend to Approved

___ Recommend NOT to Approve

Forward for Open Hearing:

___WITHOUT Reservations

___WITH Reservations:

Comments:

Robert P. Hesketh
School Committee Chr.

Step #4 (Academic Dean): X Recommended ___ NOT Recommended ___ Conditionally Recommended (See Comments)

Comments:

Dean Signature/Date 2/27/98

Step #5 (Senate Curriculum Committee): Open Hearing Date: _____ Approved by Curriculum Committee Date_____

Returned to Sponsor(s) for the following reason:

Step # 6 (Senate) Date announced/voted on at Senate _____ If voted on: ___Approved ___NOT Approved

Date forwarded to Executive Vice President/Provost _____

Senate Curriculum Committee chair Signature/Date: _____

Course Proposal

1. Details:

a) Course Title:	Quality and Reliability in Design and Manufacture
b) Sponsor:	Dr. Tirupathi R. Chandrupatla, and College of Engineering Curriculum Committee
c) Credit Hours:	3 credit hours
d) Course Level:	Junior for Mechanical Engineering
e) Curricular Effect:	Required course for Mechanical Engineering majors
f) Prerequisites:	Engineering Analysis II (1701.335)
g) Suggested Time/ Scale of Implementation	Spring 1999 One section in Spring.
h) Resources:	Faculty will be hired and equipment will be obtained consistent with approved College of Engineering development plans and budget. Computing resources will be required consistent with approved College 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. 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 quality and reliability is essential in design and manufacturing areas of mechanical engineering. Quality involves quality of form, dimension, and fit. Quality dictates the choice of manufacturing process. Reliability is the aspect where the chance of failure is reduced. Both of these factors influence the cost of products and must be chosen carefully at the design stage.

3. Essence of the Course:

a) Objectives:

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

1. Understand the importance of engineering tolerances and how to choose them in design.

2. Choose the right manufacturing processes to obtain needed quality.

3. Design experiments to study influencing factors

4. Apply basic computer tools such as spreadsheets and other software to make quality and reliability decisions.

5. Understand the concept of robust design and apply to real problems.

6. Understand and consider the influence of quality on cost of a product and use it in design and manufacturing decisions.

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
- Fundamentals of statistics
- Tests for normality
- Fundamentals of probability

Dimensioning and Tolerancing
- Tolerance and its relation to quality
- International tolerance system
- Concept of fits
- Hole basis and shaft basis systems
- Tolerance and its relation to normal distribution
- Shifts in normal distribution

Geometric Tolerances
- Form – straightness, flatness, circularity, cylindricity
- Datums
- Orientation – perpendicularity, angularity, parallelism
- Position – true position concepts, concentricity
- Runout
- Profile

Dimensioning of Assemblies
- Assembly length
- Sum of means
- Sum of standard deviations
- Selective assembly techniques

Surface Finish

Specification of surface finish
Measurement of surface finish

Quality Control
Deming's fourteen points
Cause and effect diagrams
Histograms
Control charts
Process capability
Control charts and statistical process control

Design of Experiments
2^k factorial experiments
Basic concepts and case studies
Response surface and method of level selection

Reliability
Concept of reliability
Hazard function – bath tub curve
Mean time to failure (MTTF)
Probability distribution functions and their application in reliabilty
Two parameter and three parameter Weibull distribution
Reliability of complex systems

Design for quality and reliability

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 curriculum committee. Consultations were made with ABET consultant and with mathematics department.

Catalog Description:

0910.342 **3 s.h.**
Quality and Reliability in Design and Manufacture
Prerequisites: Engineering Analysis II (1701.335)

This course introduces concepts of quality and reliability for application in design and manufacture. Basic aspects of dimensioning, tolerancing, and fits are introduced through application of the normal distribution and its variations. Geometric tolerances of form, orientation, position, and runout are presented. Aspects of process capability and statistical process control are discussed. Concepts of failure and reliability are presented.