ROWAN UNIVERSITY CURRICULUM PROPOSAL

PROPOSAL TITLE:  
Computer Integrated Manufacturing and Automation  

CHECK APPROPRIATE:  
__ UNDERGRADUATE  
✓ GRADUATE  
__ SEMESTER HOURS  

SPONSOR(S):  
Tirupathi R. Chandruputla and Dept. of Mechanical Engineering  
Curriculum Committee  

DEPARTMENT/TELEPHONE # 4632  

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

Step #1 (Department)  
✓ Approved (Date) 10/22/97  

Not Approved (Date)  

Dept. Curriculum Chair  

10/22/97  
Reviewed (Date)  

T.R. Chandruputla  
Dept. Chair  

Step #2 (Receipt)  

SCC# 97-98-13  

10-32-97  
Date Received Senate  

Step #3 (School)  

Reviewed Date: 10/22/97  
✓ Recommend to Approved  

Recommend NOT to Approve  

Forward for Open Hearing:  
✓ WITHOUT Reservations  

WITH Reservations:  
Comments:  

School Committee Chair  

Step #4 (Academic Dean):  
✓ Recommended  

NOT Recommended  

Conditionally Recommended (See Comments )  

Comments:  

Dean Signature/Date  

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 12/11/97  

if voted on:  

Approved  

NOT Approved  

L awarded to Executive Vice President/Provost  

Senate Curriculum Committee chair Signature/Date:  

12/11/97
Step #7 (Executive Vice President/Provost): Date Received: ____________

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 Vice President/Provost Signature ______________________

Registrar

Date Approved Course Description Received: 25 Jan - 98
Hegis Taxonomy and Course Number Assigned: 0910.561
Date/Signature of Registrar: 22 Apr 98

Notification Forward:

________ Senate Curriculum Committee Chairperson
________ Department Chairpersons
________ Academic Dean(s)
________ Registrar
________ Sponsor(s)
Course Proposal

1. Details:

   a) Course Title: Computer Integrated Manufacturing and Automation
   b) Sponsor: Dr. Tirupathi R. Chandrupatla and College of Engineering Curriculum Committee
   c) Credit Hours: 3 credit hours
   d) Course Level: Graduate
   e) Curricular Effect: Elective course for graduate students
   f) Prerequisites: Engineering Materials II or equivalent
   g) Suggested Time/
       Scale of Implementation: One section during fall semesters
   h) Resources:
       Faculty: Existing faculty can teach this course
       Library: No library acquisitions will be required
       Equipment: No laboratory equipment will be required
       Computers: Computer laboratory access will be required
                   and additional software may be acquired.

2. Rationale:

   The proposed course is an additional graduate engineering elective that would
   supplement 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 course introduces students to the concepts of computer aided design, computer
   integrated manufacturing and automation. The course covers various applications to industrial
   manufacturing problems.

3. Essence of the Course:

   a) Objectives:

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

       1. Understand apply the techniques of flexible manufacturing principles to real
          manufacturing problems

       2. Understand and apply the techniques of manufacturing process optimization.

       3. Perform numerical control part programming using available software.

       4. Analyze and evaluate robot kinematics, kinetics, and dynamics
5. Understand and apply computer aided process planning techniques and group technology concepts.

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 manufacturing
   Basic concepts
   Manufacturing control
   Design and manufacturing

Part design specification
   Engineering design
   Computer aided design (CAD)
   Dimensioning and tolerancing
   Geometric modeling

Process engineering
   Decision tables and decision trees
   Process capability analysis
   Process optimization

Fixed automation
   Automated manufacture
   Design for automation
   Fixed automated systems
   Hardware
   Economics
   Line balancing

Flexible automation
   Manufacturing strategies
   Lead time considerations for flexible and hard automation
   Trends in flexible automation

Group technology
   Coding and classification
   Classification systems
Process planning
   Manual process planning
   Computer aided process planning (CAPP)
   Variant process planning
   Generative approach

Introduction to numerical control (NC)
   Numerical control hardware
   Interpolation
   Positioning systems
   NC part programming

Industrial robotics
   Classification of robots
   Power sources and actuators
   Sensors and grippers
   Robot applications
   Robot kinematics and dynamics

Artificial intelligence (AI)
   AI and process planning
   AI in manufacturing planning and control

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 an additional elective that would supplement the Engineering Curriculum Proposal approved by the Faculty Senate in December 1994. Consultations were submitted with original proposal as specified by the Curriculum Committee. The course ran under the special topics category in Fall 1996.
Catalog Description:

**Computer Integrated Manufacturing and Automation** (0910.501)
Prerequisites: Engineering Materials II or equivalent

The course covers the basic aspects of computer integrated manufacturing and automation systems. Hard and flexible automation concepts are introduced. Various automation strategies are presented. Coding and classification ideas of group technology are related to computer aided process planning. Topics of numerical control, industrial robotics, and artificial intelligence are discussed.