## Rowan University Curriculum Proposal

**Proposal Title:** Introduction to Computer Integrated Manufacturing and Automation

**Check Appropriate:**
- ✔ Undergraduate
- **Graduate**
- **Semester Hours**

**Sponsor(s):** Tirupathi R. Chandrupatla 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): 11/27/97

Dept. Curriculum Chair:

Date Reviewed: 10/22/97

Dept. Chair: P.R. Chandrupatla

### Step #2 (Receipt)

- SCC#: 97-98-E4
- Date Received Senate: 10-22-97

### 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: 12/11/97

### Step #5 (Senate Curriculum Committee)

- Open Hearing Date: 12/11/97
- Approved by Curriculum Committee Date: 1/21/98

Returned to Sponsor(s) for the following reason:

Comments:

Current Action: 1/21/98

### Step #6 (Senate)

- Date announced/voted on at Senate: 1/28/98
- if voted on: ✔ Approved
- **NOT Approved**

Forwarded to Executive Vice President/Provost:

Senate Curriculum Committee chair Signature/Date: 1/28/98
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 [Signature]

Registrar

Date Approved Course Description Received ______
Hegis Taxonomy and Course Number Assigned ______
Date/Signature of Registrar ______

Notification Forward:

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

1. Details:

   a) Course Title: Introduction to 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: Senior (0910.401)
   e) Curricular Effect: Elective course for undergraduate students in mechanical engineering
   f) Prerequisites: Engineering Materials II (0901.282) 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 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.
Catalog Description:

Introduction to Computer Integrated Manufacturing and Automation (0910.401)
Prerequisites: Engineering Materials II (0901.282) 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.