

PROPOSAL NUMBER: 99-421

CURRICULUM PROPOSAL FORM

***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: Mechatronics
SPONSOR/S: Jawaharlal Mariappan, Associate Professor
DEPARTMENT: Mechanical Engineering
0910.442

CHECK ALL THAT APPLY:

UNDERGRADUATE GRADUATE

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



TYPE OF PROPOSAL. (Check ALL that Apply)

<input type="checkbox"/> General Education <input type="checkbox"/> New Course in _____ Bank <input type="checkbox"/> Existing course, Add To _____ Bank <input type="checkbox"/> Multicultural/Global Designation <input type="checkbox"/> Writing Intensive Designation <input type="checkbox"/> New Minor/Concentration/Specialization <input type="checkbox"/> New Major/Degree Program <input type="checkbox"/> Short Term Course Proposal	<input checked="" type="checkbox"/> New Course (NOT Gen. Ed.) <input type="checkbox"/> Name Change (Dept., School, Major) <input type="checkbox"/> Changes in Degree Requirements <input type="checkbox"/> Changes Involve Gen. Ed. requirements <input type="checkbox"/> Minor Changes to Existing Courses <input type="checkbox"/> Course is NOT General Education <input type="checkbox"/> Course IS General Education
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DEPARTMENT
 (SIGNATURE INDICATES APPROVAL)

W. H. ... *TR Chandrasekhar* 10/22/98
 DEPT. CURRICULUM CHAIR / DATE DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE
 DATE OF OPEN HEARING (if necessary) _____

APPROVED
 NOT APPROVED
 COMMENTS:

P. K. ... 2/10/99
 SIGNATURE DATE

ACADEMIC DEAN (& GRADUATE DEAN, for New Graduate Programs Only)

APPROVED
 NOT APPROVED
 COMMENTS:

J. ... 10/23/98
 SIGNATURE (Academic Dean) DATE

 SIGNATURE (Graduate Dean) DATE

UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 3/10/99 (College level only)

APPROVED

NOT APPROVED

COMMENTS:

Francis Reub 4/1/99
SIGNATURE DATE

SENATE

Date announced at Senate 3/23/99

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 [Signature]

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED _____

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED C910.442

DATE/SIGNATURE OF REGISTRAR Robert A. Kubat 4/19/99

NOTIFICATION FORWARD:

SENATE CURRICULUM COMMITTEE CHAIRPERSON

DEPARTMENT CHAIRPERSONS

ACADEMIC DEAN(S)

REGISTRAR

SPONSOR(S)

T.M. 4/27/99

Course Proposal

1. Details

- a) Course Title: Mechatronics (0910-442)
- b) Sponsor: Dr. Jawaharlal Mariappan and School of Engineering Curriculum Committee
- c) Credit Hours: 3 Credit Hours
- d) Course Level: Senior for Mechanical Engineering
- e) Curricular Effect: Elective course for mechanical engineering majors. Can also be taken by electrical, chemical and civil majors.
- f) Prerequisites: Junior Engineering Clinic II (0901.302)
- g) Suggested Time: Fall 1999
Scale of Implementation: One section in Fall
- h) Resources: Faculty: Existing faculty can teach this course
Library: No library acquisitions will be used
Equipment: Laboratory equipment and apparatus will be required.
Computers: Computer laboratory access and additional software will be required..

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

Mechatronics (combination of **Mechanical** and **Electronics**) is a new concept that represents the synergistic integration of mechanical, electronics and intelligent computer control in the design and manufacturing of products and processes. The Mechatronics course at Rowan provides students with knowledge and skills necessary for multidisciplinary design. Specifically, it will teach the students the design of electro-mechanical systems to perform mechanical functions efficiently and reliably by the application of computer control through electronic interfaces.

3. Essence of the Course:

a) Objectives

Upon completion of the course, students will be able to

1. Understand the integration of mechanical, electrical and computer technology.

2. Select sensors and actuators
3. Develop and implement control algorithms
4. Perform detail design of at least one sub-system of and take part in the overall design of other sub-systems.
5. Implement a complete mechatronic project from scratch.

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

The Mechatronics Philosophy

A Mechatronic System and its Elements

Mechatronic Applications (ABS System, Active Suspension, Mobile Robots, etc.)

Creativity and Reverse Engineering in Mechatronic Design

Mechanical, Electrical and Electronics for Mechatronics

Power and Energy; Electrical Technology; Analog and Digital Electronics

Modeling Mechatronic Systems

Concept of Energy Flow; Bond Graph Representation

Transformation Matrices in Modeling Analysis of Mechanical System

Mechatronic System Approach and Product Design Guidance

Sensors

Physical Principles

Force, Sound and Light Sensors

Air-Fuel Ratio Sensor, Magnetic Motion Sensor

Electronic Crash Sensing Unit for Airbag

Other types of Sensors and Smart Sensor Applications

Actuators

Solenoid-type Devices

Motors

Electro-Pneumatic and Hydraulic Systems

Microprocessor Technology

Basic Principles and Microcomputer Architecture
Data Acquisition and Control Applications
Programming

Control System Modeling

System Representation: Transfer Functions; Control Algorithms.

Interfacing

Analog and Digital Interfacing; Interfacing Sensors; Interfacing Motors

Putting It All Together

Mechatronic System
Synthesis, Design, Analysis and Applications

Advanced Topics

Neural Networks; Fuzzy Logic; Design of Experiments
New Technology

c) Evaluation and Grading Procedure of Students:

Student grades will be determined on the basis of examinations, homework, laboratory assignments, projects and reports. A course syllabus with stated method of arriving at the final grade, e.g., number of exams, homework, projects, 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:**Mechatronics (0910.442)**

Prerequisites: Junior Engineering Clinic II (0901.302)

This course introduces the students to the design and development of mechatronic systems. It introduces the students to the multidisciplinary nature of mechatronic products, and teaches them to design and develop such products. Students will learn about mechatronic design philosophy, mechatronic system modeling, sensors, actuators, microprocessors and their interfaces. The course project will involve the design of a real-world mechatronic system.