

ROWAN UNIVERSITY CURRICULUM PROPOSAL

PROPOSAL TITLE: Advanced Mechanism Design For Undergraduates

CHECK APPROPRIATE: UNDERGRADUATE GRADUATE SEMESTER HOURS

SPONSOR(S): Jawaharlal Mariappan, Associate Professor, Mechanical Engineering

DEPARTMENT/TELEPHONE # Mechanical Engineering, 609-256-4645

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

<p>Step #1 (Department)</p> <p><input checked="" type="checkbox"/> Approved (Date) <u>2/27/98</u></p> <p><input type="checkbox"/> Not Approved (Date)</p> <p style="text-align: center;"><u><i>AZ</i></u> Dept. Curriculum Chr.</p> <p style="text-align: center;"><u>2/26/98</u> Reviewed (Date)</p> <p style="text-align: center;"><u><i>T. Chandrasekhar</i></u> Dept. Chr.</p>	<p>Step #2 (Receipt)</p> <p style="text-align: center;"><u>SCC# 97-98-300</u></p> <p style="text-align: center;"><u>2-27-98</u> Date Received Senate</p> <p style="text-align: center;">_____ Senate Curriculum Chr.</p>	<p style="text-align: center;">Step #3 (School)</p> <p style="text-align: right;">Reviewed Date: <u>2/25/98</u></p> <p><input checked="" type="checkbox"/> Recommend to Approved</p> <p><input type="checkbox"/> Recommend NOT to Approve</p> <p>Forward for Open Hearing:</p> <p><input checked="" type="checkbox"/> WITHOUT Reservations</p> <p><input type="checkbox"/> WITH Reservations:</p> <p>Comments:</p> <p style="text-align: right;"><u><i>Robert P. Healy</i></u> School Committee Chr.</p>
---	---	---

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

Comments:

Dean Signature/Date: *James P. Sweeney* 2/27/98

Step #5 (Senate Curriculum Committee): Open Hearing Date: _____ Approved by Curriculum Committee Date 4/28/98

Returned to Sponsor(s) for the following reason:

Step #6 (Senate) Date announced/voted on at Senate 4/28 If voted on: Approved NOT Approved

Date forwarded to Executive Vice President/Provost 5/11/98

Senate Curriculum Committee chair Signature/Date: *Janetta Reeves* 5/8/98

Step #7 (Executive Vice President/Provost): Date Received 8/26/98

Approved

NOT Approved If no, reasons are as follows:

Student Credit Hours 2

Faculty Load Hours _____

Equalized Credit Hours _____

Official Copy & Approval Sheet Filed (Date) 8/26/98

Executive Vice President/Provost Signature [Signature]

Registrar

Date Approved Course Description Received _____

gis Taxonomy and Course Number Assigned 111111

Date/Signature of Registrar [Signature]

Notification Forward:

Senate Curriculum Committee Chairperson

Department Chairpersons

Academic Dean(s)

Registrar

Sponsor(s)

Course Proposal

1. Details:

- a) **Course Title:** Advanced Mechanism Design for Undergraduates
- b) **Sponsor:** Dr. Jawaharlal Mariappan and College of Engineering Curriculum Committee
- c) **Credit Hours:** 3 credit hours
- d) **Course Level:** Senior (0910.441)
- e) **Curricular Effect:** Elective course for senior engineering students
- f) **Prerequisites:** Mechanical Design and synthesis or consent of instructor

- g) **Suggested Time/
Scale of Implementation** One section during fall/spring semesters
- h) **Resources:**
 - Faculty: Existing faculty can teach this course
 - Library: No library acquisitions will be used
 - Equipment: No laboratory equipment will be required
 - Computers: Computer laboratory access will be required and additional software will 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.

This course introduces the students to the design of planar and spatial mechanisms. A unique feature of this course is that it will use matrix methods as the single platform model, synthesize, analyze and simulate any mechanism. Some of the mechanisms covered in this course are general purpose four-bar and six-bar, dwell and window regulator, and suspension mechanisms. Advanced design techniques that include type synthesis, numerical optimization techniques as applied to mechanism design will also be covered. Branch defects and circuit defects that occur during mechanism synthesis will also be addressed. In addition, modeling and simulation of mechanical systems such as suspension and windshield wiper will be covered in-depth with the use of appropriate mechanism simulation software. The major difference between this course and the graduate level course is in the scale and complexity of the course project.

Mechanism Analysis
Position, Velocity, Acceleration and Force Analysis
Spatial Mechanisms
Spatial Transformations
Modeling and Analysis of Spatial Mechanisms

Defects During Mechanism Synthesis
Branch and Circuit Defects
Method for Identifying and Eliminating Defects

Numerical Optimization Methods in Mechanism Synthesis
Problem Formulation for Optimization and Design of Experiments
Integrated Approaches for Mechanism Synthesis, Analysis and Simulation
Knowledge-based Approaches in Mechanism Design
Mechanism Design Software Overview

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 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:

Advanced Mechanism Design for Undergraduates (0910.441)

Prerequisites: Mechanical Design and Synthesis or the consent of instructor

This course presents an in depth coverage of the design of mechanisms using matrix methods as the platform to model, synthesize, analyze and simulate mechanisms. It covers advanced design techniques that include type synthesis, numerical optimization techniques as applied to mechanism design synthesis, as well as branch defects and circuit defects that occur during mechanism synthesis. In addition, it covers the modeling and simulation of mechanical systems using appropriate mechanism design software. Students will perform analysis and simulation of mechanisms.