

ROWAN UNIVERSITY CURRICULUM PROPOSAL

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OSAL TITLE:

MECHANICAL DESIGN AND SYNTHESIS

C 910 -- 341

CHECK APPROPRIATE: UNDERGRADUATE GRADUATE 4 SEMESTER HOURS

SPONSOR(S): Dr. Jawaharlal Mariappan and School of Engineering Curriculum Committee

DEPARTMENT/TELEPHONE # Department of Mechanical Engineering. 609-256-4644

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

Step #1 (Department)	Step #2 (Receipt)	Step #3 (School)
<p>10/22/97 Approved (Date) <input checked="" type="checkbox"/></p> <p><input type="checkbox"/> Not Approved (Date)</p> <p>_____</p> <p>Dept. Curriculum Chr.</p> <p>10/22/97</p> <p>Reviewed (Date)</p> <p><u>J.R. Chandrapattin</u></p> <p>Dept. Chr.</p>	<p>SCC# <u>97-98-28</u></p> <p>10-22-97</p> <p>Date Received Senate</p> <p>_____</p> <p>Senate Curriculum Chr.</p>	<p>Reviewed Date: <u>10/22/97</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><u>Robert J. Herbeth</u></p> <p>School Committee Chr.</p>

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

Comments:

Dean Signature/Date: J. Stang 10/23/97

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 12/16/97 if voted on: Approved NOT Approved

Forwarded to Executive Vice President/Provost _____

Senate Curriculum Committee chair Signature/Date: J. Reeves 12/16/97

Executive Vice President/Provost): Date Received: 11/26/98

proved

NOT Approved If no, reasons are as follows:

Student Credit Hours _____

Faculty Load Hours _____

Equalized Credit Hours _____

Official Copy & Approval Sheet Filed (Date) 11/26/98

Executive Vice President/Provost Signature *C. M. Atkinson*

Registrar

Date Approved Course Description Received 28 Jan 98

Hegis Taxonomy and Course Number Assigned 0910-341

Date/Signature of Registrar *B. F. Kelsey*

Notification Forward:

_____ Senate Curriculum Committee Chairperson

_____ Department Chairpersons

_____ Academic Dean(s)

_____ Registrar

_____ Sponsor(s)

Course Proposal

1. Details

- a) Course Title: Mechanical Design and Synthesis
b) Sponsor: Dr. Jawaharlal Mariappan and School of Engineering Curriculum Committee
c) Credit Hours: 4 Credit Hours
d) Course Level: Junior for Mechanical Engineering
e) Curricular Effect: Required course for mechanical engineering majors
f) Prerequisites: *Dynamics* ~~Vibrations~~ and Engineering Materials *PI* *J. J. J. J.*
g) Suggested Time: Fall 1998
Scale of Implementation: One section in Fall
h) Resources: Faculty will be hired and equipment will be obtained consistent with approved School of Engineering development plans and budget. Additional software, hardware, laboratory equipment and apparatus will be required. Library sources 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 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.

This course is designed to provide junior mechanical engineering students with knowledge and skills necessary for design, selection and analysis of basic machine elements, power transmission components and systems, and the synthesis of mechanisms.

This course is a prerequisite for courses on system dynamics and other elective courses.

3. Essence of the Course:

a) Objectives

Upon completion of the course, students will be able to

1. Understand the mechanical design and synthesis process.

2. Design and select basic machine elements such as springs, bearings, screws, fasteners, shafts, couplings, clutches, brakes, gears, belts and chains.
3. Design linkage and cam mechanisms.
4. Apply CAE software packages for design analysis.
5. Implement a complete mechanical design 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 to Mechanical Design

- Design case studies
- Stress, strain, and deflection
- Failure theories

Machine Elements

- Shafts, keys and couplings
- Bearings
 - Rolling element bearings
 - Hydrodynamic bearings
- Springs
- Gears
 - Gear terminology and forces
 - Spur, helical, bevel, and worm gears
 - Gear trains and transmission
- Screws and fasteners
- Clutches and brakes

Mechanisms and Machinery Design

- Type and dimensional Synthesis
- Four bar and six bar linkages
- Path, function, and motion generation
- Graphical analytical synthesis of linkage mechanisms
- Instant centers
- Position, velocity and acceleration analysis
- Cam design
- Dynamic Analysis and Synthesis

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:

Mechanical Design and Synthesis (0910.341)

Prerequisites: ~~Vibrations~~, Engineering Materials ~~II~~ I

Dynamics

H. J. J. J.

This course introduces the students to mechanical design process, synthesis techniques, and modern analysis tools. First part of the course deals with the design and selection of machine elements such as shafts, couplings, bearings, gears, springs, clutches, brakes, screws, and fasteners. The second part of the course focuses on synthesis of linkage and cam mechanisms. Laboratory experience will include computer simulation and analysis. Design experience will be synergistically integrated throughout the curriculum and culminate in a design project.