

Electrical Engr

(K)

PROPOSAL NUMBER: 99- 466

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: PRODUCT ENGR.
SPONSOR/S: DR. J. SCHWARTZ & ECE CURR. COMM.
DEPARTMENT: ENGINEERING 0909.405

CHECK ALL THAT APPLY:
 UNDERGRADUATE _____ GRADUATE
COLLEGE: ENGINEERING
If LAS: _____ History/Humanities
_____ Math/Sciences
_____ Social/Behavioral Sciences

TYPE OF PROPOSAL (Check ALL that Apply)
_____ General Education
_____ New Course in _____ Bank
_____ Existing course, Add To _____ Bank
_____ Multicultural/Global Designation
_____ Writing Intensive Designation
_____ New Course (NOT Gen. Ed.)
_____ Name Change (Dept., School, Major)
_____ Changes in Degree Requirements
_____ Changes Involve Gen. Ed. requirements
_____ Minor Changes to Existing Courses
_____ Course is NOT General Education
_____ Course IS General Education
_____ New Minor/Concentration/Specialization
_____ New Major/Degree Program
_____ Short Term Course Proposal

DEPARTMENT (SIGNATURE INDICATES APPROVAL)
Ravi Prakash Rameshbabu 03/04/99
DEPT. CURRICULUM CHAIR / DATE
[Signature] 06 MAR 99
DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE
DATE OF OPEN HEARING (if necessary) 4/20/99
 APPROVED
_____ NOT APPROVED
Comments:
Ravi P. Hesketh 4/20/99
SIGNATURE DATE

ACADEMIC DEAN (& GRADUATE DEAN, for New Graduate Programs Only)
_____ APPROVED
_____ NOT APPROVED
Comments:
[Signature] 3/5/99
SIGNATURE (Academic Dean) DATE
SIGNATURE (Graduate Dean) DATE

UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 4/20/99 (college level)

APPROVED

NOT APPROVED

Comments:

Senate Review 5/7/99

SIGNATURE DATE

SENATE

Date announced at Senate 4/30/99

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] 5/20/99

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED _____

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED 0909.405

DATE/SIGNATURE OF REGISTRAR Robert A. Kubot 7/6/99

NOTIFICATION FORWARD:

SENATE CURRICULUM COMMITTEE CHAIRPERSON

DEPARTMENT CHAIRPERSONS

ACADEMIC DEAN(S)

REGISTRAR

SPONSOR(S)

Course Proposal

1. Details:

a) Course Title:	Product Engineering (0909.405)
b) Sponsor:	Dr. John L. Schmalzel, Electrical and Computer Engineering (ECE) and ECE Curriculum Committee
c) Credit Hours:	3 credit hours
d) Course Level:	Undergraduate (UG)
e) Curricular Effect:	Technology Focus Elective course for UG student
f) Prerequisites:	Senior standing, Junior Clinic II (0901.302).
g) Suggested Time/ Scale of Implementation	Fall 1999 and beyond One section
h) Resources	No additional faculty are needed to meet this requirement. Laboratory equipment will be obtained consistent with College of Engineering multi-year budget. No additional library acquisitions will be required.

2. Rationale:

The proposed course is a revision to 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.

Engineering practice spans many areas of activities including product development, process design, and a wide variety of engineering services. Product engineering is unique in that it must combine a variety of engineering and non-engineering disciplines into a coherent strategy to produce a product that meets specifications on time and within budget. Time to market is a key component of a successful product engineering strategy; concurrent engineering describes the parallel involvement of major contributors to product realization such as marketing, design, manufacturing, sales and support, etc. There has been a shift in competitive priorities as functional design competence has been globalized. This has caused a shift in focus to find new sources and techniques for adding value to products. For example, the emergence of emotional function as a complement to technical function.

This places additional challenges to engineers contemplating product design. They must be particularly adept at working with the rapid design and prototyping tools of their particular disciplines, and they must be able to contribute in strongly multidisciplinary design teams.

3. Essence of the Course:

a) Objectives:

The proposed course has a number of objectives:

- (i) Provide an overview of the product engineering process. This builds on the background of basic product development gained through experience with the engineering clinics. Examine the major steps in the product design process beginning with requirements definitions and proceeding through iterative design, manufacturing and life-cycle management.
- (ii) Identify the variety of interface points for the types of participants expected to contribute to typical product development.
- (iii) Incorporate rapid prototyping tools that represent state-of-the-art practice.
- (iv) Involve multiple disciplines through formal and informal consultant arrangements.
- (v) Provide opportunities to apply didactic principles in product design applications.

b) Topical Outline:

The content of the course will reflect current practice.

- Provide an overview of the product engineering process. The basic steps in product design. The traditional engineering process: product definition, specification, design alternatives, design selection, detailed design, prototyping, verification, design iteration, manufacturing, and life-cycle management. The modern product engineering paradigm: customer identification, customer attribute selection, product form and function specification, compliance and verification design, incremental design (evolutionary vs. revolutionary product development), virtual and rapid prototyping, customer evaluation, design iteration, distributed manufacturing, environmental impact assessment and mitigation. Communication across disciplinary boundaries, management of complex projects.
- Review case studies of product designs to identify and analyze the participants and the strengths/weaknesses of the product engineering process.
- Organize and integrate the spectrum of rapid prototyping tools available within the college and compare to current industrial practices. Reinforce methods for computer-aided design for mechanical and electrical components (solids modeling, design capture and simulation) and for rapid prototyping (multi-jet modeling, stereolithography, programmable array logic, etc.). Consider the emerging role of virtual reality (VR) as a method for assessing the interplay between customer and prototype.

- Develop design language that spans several disciplines including engineering disciplines and any of an array of other disciplines that contribute to modern product development. Examples include industrial designers, anthropologists, psychologists, computer scientists, interaction designers, and many others. Multiple business perspectives are also important, especially marketing and sales. Provide experience with other disciplines through formal and informal consultant arrangements.
- Include product design experience to complement lecture and discussion topics.

c) Evaluation and Grading Procedures:

Student grades will be based on projects, examinations, homework, and written and oral technical communication. Graduate students enrolled in the course will perform additional assignments (e.g., perform research into new areas of product design research) and will be expected to implement a significantly more complex product development.

d) Course Evaluation:

The proposed course will be evaluated based on student evaluations and critical review by engineering faculty in conjunction with outside consultants/participants.

e) Texts:

This course will be supported through a variety of readings and lecture notes. When possible, outside speakers will be invited to give guest presentations.

D. Reinertsen, *Managing the Design Factory: The Product Developer's Toolkit*. Free Press, ISBN 0684839911, 1997.

C. Erhorn, J. Stark, *Competing by Design: Creating Value and Market Advantage in New Product Development*. J. Wiley & Sons, ISBN 0471132160, 1995.

S. Pugh, *Creating Innovative Products Using Total Design*. Addison-Wesley, ISBN 0201634856, 1996.

R.E. Kmetovicz, *New Product Development: Design and Analysis*. J. Wiley & Sons, ISBN 0471555363, 1992.

4. Results of Consultations:

a) Consulted Departments: Mechanical Engineering, Computer Science, Marketing.

b) Consultants and Consultant Statements:

c) Written Consultations:

5. Additional Supporting Information:

6. Catalog Description:

TITLE: Product Engineering

This course treats product engineering from a variety of perspectives including engineering and non-engineering viewpoints to explore important elements for modern design. Techniques and tools of rapid prototyping including virtual reality are treated. Important course concepts are reinforced through product design experiences.

Prerequisite: Senior standing, Junior Clinic II (0901.302).