Electrical Eng

PROPOSAL NUMBER: 99- 464

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: FORENSIC ENGINEERING & PRODUCT LIABILITY

SPONSOR/S: J. SCHMALZEL & ECE Curr. Com.

DEPARTMENT: ENGINEERING 0909.406

CHECK ALL THAT APPLY:
__X__ UNDERGRADUATE _____ GRADUATE

COLLEGE: ENGINEERING

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

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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 Minor/Concentration/Specialization
_____ New Major/Degree Program
_____ Short Term Course Proposal

__X__ 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*

DEPARTMENT
(SIGNATURE INDICATES APPROVAL)

Ravi Prith Ramachandran 03/09/99
DEPT. CURRICULUM CHAIR / DATE

06/11/99
DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE
DATE OF OPEN HEARING (if necessary) 4/20/99

X APPROVED

----- NOT APPROVED
Comments:

Robert P. Hesketh 4/20/99
SIGNATURE DATE

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

✓ APPROVED

----- NOT APPROVED
Comments:

3/9/99
SIGNATURE (Academic Dean) DATE

SIGNATURE (Graduate Dean) DATE

UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 4-20-94 (College Level)

----- APPROVED

----- NOT APPROVED

Comments:

[illegible] 5/7/94

SIGNATURE DATE

SENATE

Date announced at Senate 4/30/94

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 C J Mott 5/26/94

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED _____

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED 0909.40E

DATE/SIGNATURE OF REGISTRAR Robert A. Kubat 7/6/94

NOTIFICATION FORWARD:

__✓__SENATE CURRICULUM COMMITTEE CHAIRPERSON

__✓__DEPARTMENT CHAIRPERSONS

__✓__ACADEMIC DEAN(S)

__✓__REGISTRAR

_____SPONSOR(S)

Course Proposal

1. Details:

a) Course Title:	Forensic Engineering and Product Liability (0909.406)
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 students
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.

Analysis of failures is an essential method for improving products and systems. There are many high-visibility accidents such as the near melt-down of the reactor core at Three-Mile Island, the Kansas City Hyatt Regency Walkway incident, the Pinto gas tank scandal, the loss of the Space Shuttle *Challenger*, etc. Many of these incidents attain almost mythological standing—e.g., the sinking of the *Titanic*. From a pragmatic point of view, failure is inherent in the process of engineering. Products can only survive for a finite life; the designer attempts to estimate the envelope of insults that will be presented to the system and designs to minimize forseen risks to an acceptable level. Many accidents are simply excursions beyond predicted environmental stresses. Others are due to inaccurate or incomplete modeling of system requirements. The science of studying failure is termed "forensic engineering."

More recently, the practice of engineering has become a much higher exposure field that places engineers and engineering firms at risk for lawsuits that seek to recover actual and punitive damages for loss of life and property due to product failures. This introduces new requirements to modern engineering practice. Thorough documentation has always been a

requisite for supporting intellectural property claims; now it is important to provide substantiation for the completeness of the design process and to show how potential for failure was recognized.

3. Essence of the Course:

a) Objectives:

The proposed course has a number of objectives:

(i) Provide an overview of the forensic engineering process. Using well-known examples, expand the student's awareness of the impact of forensic engineering on evolving engineering practice. Cite relevant forensic engineering standards.

(ii) Identify elements of product liability including the legal definitions and examples from case law. Illustrate the cause-effect relationship of product liability to the engineering design process.

(iii) Provide opportunities to apply didactic principles in evaluations of product designs using forensic approaches to determine causes of failures. Provide design solutions that solve the identified failure modes. Apply analysis techniques to predict potential failure modes of representative products and design approaches to reduce liability.

b) Topical Outline:

The content of the course will reflect current practice using examples drawn from both historical and modern contexts.

- Provide an overview of the forensic engineering process. Using well-known examples from the literature, analyze each case study to determine the cause of failure. Identify failures in the applicable engineering design methodologies, in the engineer's work, during reduction to practice, during use, or other context. Propose solutions to known failures and compare to actual actions. Outline the steps required to perform valid forensic engineering studies; safe guard evidence, document findings, etc.

- Introduce fundamental ideas of product liability. Definitions of simple, gross negligence. Introduction to applicable laws and legal precedence. The civil lawsuit process. Plaintiffs, defendants, courts, attorneys, expert witnesses, and juries. The role of the Professional Engineer.

- Explore the cause-effect relationship of product liability to the engineering design process. Identify good and bad engineering practices from the standpoint of impact on liability. Develop methodologies for incorporating liability considerations in the design process.

- Perform forensic analyses on representative product or system failures. Identify proximate causes of failure. Propose and validate design improvements that correct failure mechanisms and reduce liability exposure.

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 additional aspects of case law) and will be expected to analyze significantly more complex product failures.

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.

S. Brown, *Forensic Engineering*. ISI Publishers, ISBN 0964553600, 1995.

J.J. Phillips, *Product Liability in a Nutshell*. West/Wadsworth, ISBN 0314225854, 1998.

L.K. Enghagen, *Fundamentals of Product Liability Law for Engineers*. Industrial Press, ISBN 0831130393, 1992.

J.R. Hunziker and T.O. Jones, *Product Liability and Innovation: Managing Risk in an Uncertain Environment*. National Academy Press, ISBN 0309051304, 1994.

4. Results of Consultations:

a) Consulted Departments: Civil and Environmental Engineering, Mechanical Engineering, Computer Science, Law and Justice Studies.

b) Consultants and Consultant Statements:

c) Written Consultations:

5. Additional Supporting Information:

6. Catalog Description:

TITLE: Forensic Engineering and Product Liability

This course examines engineering failure from both the forensics and liability perspectives. Forensic engineering seeks to discover the reason for product or system failure. Product liability seeks to assign and quantify blame for that failure. Methods of forensic engineering are presented. The implications of product liability on the design process are considered from several perspectives. The course is complemented with practical applications.

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