CURRICULUM PROPOSAL FORM

*DEADLINES:

PROPOSAL TITLE: BACKPLANE DESIGN
SPONSOR/S: J. SCHMITZ & ECE CORR. COMM.
DEPARTMENT: ENGINEERING

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

DEPARTMENT (SIGNATURE INDICATES APPROVAL)

DEPT. CURRICULUM CHAIR / DATE
DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE
DATE OF OPEN HEARING (if necessary)

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

SIGNATURE (Academic Dean) DATE

SIGNATURE (Graduate Dean) DATE
UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 2/12/99

-- APPROVED

----- NOT APPROVED

Comments:

T. Harrell Rice 5/7/99

SIGNATURE DATE

SENATE

Date announced at Senate 2/3/99

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

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED  

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED 0904 481

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

NOTIFICATION FORWARD:

\ Senate Curriculum Committee Chairperson

\ Department Chairperson(s)

\ Academic Dean(s)

\ Registrar

\ Sponsor(s)
Course Proposal

1. Details:

a) Course Title: Backplane Design (0909.481)
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: Elective course for UG students
f) Prerequisites: Digital hardware background including VHDL—Permission of Instructor

Fall 1999 and beyond
One section
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.

g) Suggested Time/Scale of Implementation

h) Resources

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.

Backplanes support modern computing and instrumentation systems. This is a very active area of technology development because many system performance issues are ultimately resolved by selecting an appropriate backplane architecture or optimizing the performance of elements designed to work with a previously selected backplane. While the major emphasis of this course will be on short-run buses (i.e., “in the box”), the continued development of high-speed serial buses intended to operate over relatively long distances (i.e., “out of the box”) can’t be ignored since they pose direct competition.

3. Essence of the Course:

a) Objectives:

The proposed course has a number of objectives:
(i) Provide a working knowledge of fundamental backplane terms and concepts; e.g., bandwidth, control methods, parallel vs. serial buses, analog vs. digital backplanes.

(ii) Provide an overview of backplane architectures. Survey representative backplanes paying particular attention to current and proposed standards.

(iii) Introduce modeling and measurement tools appropriate to backplane design.

(iv) Provide opportunities to apply didactic principles in a representative bus interface design application.

b) Topical Outline:
The content of the course will be designed to reflect current practice.

- Backplane architecture. Introduce basic definitions and features of backplanes.
- Backplane elements. Examine several current backplane technologies. For example, PCI bus, IEEE 1394, VMEbus, IEEE-488, SCSI, VXIbus, etc. Compare performances of competing backplane technologies and examine interfacing techniques. Examine bus master/slave hierarchies.
- Modeling and analysis tools. Introduce the modeling tools needed to support backplane analysis and synthesis. Emphasize the use of VHDL as the modeling suite useful for implementing backplane interfaces as well as simulating the necessary test vectors. Introduce the use of protocol analyzers for representative backplanes. Incorporate logic analysis equipment as in situ measurement tools for examining real-time bus operations.
- Applications. Solve a representative backplane design problem(s).

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 backplane structures) and will be expected to implement significantly more complex applications.

d) Course Evaluation:
The proposed course will be evaluated based on student evaluations and critical review by engineering faculty.

e) Texts:
Currently, no definitive texts exist in this topic area that adequately survey many backplane architectures. Representative books include several titles by D. Anderson:


Another possible title is J. Black’s book:


In addition, there are standards published for all major backplane interfaces. For example:


The best approach will be to adopt a book that covers a widely-used, powerful backplane, such as PCI. Then the course will be complemented by course notes derived from backplane product vendors. Prior experience with using a published standard (e.g., IEEE 1155-1992 for VXIbus) suggests that it can complement a course, but it is difficult to base an entire course on a single standard.

4. Results of Consultations:

   a) **Consulted Departments**: Computer Science.

   b) **Consultants and Consultant Statements**:

   c) **Written Consultations**:

5. **Additional Supporting Information**:
6. Catalog Description:

TITLE: Backplane Design

The course provides an overview of backplane design for a variety of digital systems. It surveys current technologies with treatment of emerging and updated standards. Methods of analysis, synthesis, and verification of backplane systems are presented. The course is complemented with project work for typical applications.

Prerequisite: Digital hardware background that includes VHDL—Permission of Instructor