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PROPOSAL NUMBER: 99- 474

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: Computer Architecture I: Introduction (0909.481)

SPONSOR/S: Dr. John L. Schmalzel

DEPARTMENT: ENGINEERING 0909 474

CHECK ALL THAT APPLY:
 UNDERGRADUATE GRADUATE

COLLEGE: ENGINEERING

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

TYPE OF PROPOSAL (Check ALL that Apply)

<input type="checkbox"/> General Education	<input checked="" type="checkbox"/> New Course (NOT Gen. Ed.)
<input type="checkbox"/> New Course in <u>Bank</u>	<input type="checkbox"/> Name Change (Dept., School, Major)
<input type="checkbox"/> Existing course, Add To <u>Bank</u>	<input type="checkbox"/> Changes in Degree Requirements
<input type="checkbox"/> Multicultural/Global Designation	<input type="checkbox"/> Changes Involve Gen. Ed. requirements
<input type="checkbox"/> Writing Intensive Designation	<input type="checkbox"/> Minor Changes to Existing Courses
<input type="checkbox"/> New Minor/Concentration/Specialization	<input type="checkbox"/> Course is NOT General Education
<input type="checkbox"/> New Major/Degree Program	<input type="checkbox"/> Course IS General Education
<input type="checkbox"/> Short Term Course Proposal	

DEPARTMENT (SIGNATURE INDICATES APPROVAL)

John L. Schmalzel MAY 24, 1999

DEPT. CURRICULUM CHAIR / DATE DEPT. CHAIRPERSON / DATE

COLLEGE CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) _____

----- APPROVED late submission

----- NOT APPROVED heard at full SCC level

Comments: _____

SIGNATURE DATE

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

----- APPROVED

----- NOT APPROVED

Comments: _____

John L. Schmalzel 5/24/99
SIGNATURE (Academic Dean) DATE

SIGNATURE (Graduate Dean) DATE

UNIVERSITY CURRICULUM COMMITTEE

DATE OF OPEN HEARING (if necessary) 5/27/99

APPROVED

----- NOT APPROVED

Comments:

Faculty Review 5/27/99

SIGNATURE DATE

SENATE

Date announced at Senate 5/27/99 (email)

Voted upon at Senate: _____ Approved _____ Not Approved _____ Date: _____

EXECUTIVE VICE PRESIDENT/PROVOST

____ APPROVED

JUN 10 1999

____ 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. M. ... 6/16/99*

REGISTRAR

DATE APPROVED COURSE DESCRIPTION RECEIVED _____

HEGIS TAXONOMY & COURSE NUMBER ASSIGNED *0909.443*

DATE/SIGNATURE OF REGISTRAR *Robert A. Hubert 7/26/99*

NOTIFICATION FORWARD:

SENATE CURRICULUM COMMITTEE CHAIRPERSON

DEPARTMENT CHAIRPERSONS

ACADEMIC DEAN(S)

REGISTRAR

____ SPONSOR(S)

FIM 7/26/99

Course Proposal

1. Details:

a) Course Title:	Computer Architecture I: Introduction (0909.443)
b) Sponsor:	Dr. John L. Schmalzel, Electrical Engineering and Electrical Engineering Curriculum Committee
c) Credit Hours:	2 credit hours
d) Course Level:	Senior
e) Curricular Effect:	Required course for electrical engineering majors
f) Prerequisites:	Digital II 0909.242
g) Suggested Time/ Scale of Implementation	Fall 1999 One section
h) Resources	Faculty will be hired and laboratory equipment obtained consistent with College of Engineering multi-year budget. 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.

A foundation element of modern electrical and computer engineering is advanced digital systems theory and design. This represents a substantial portion of the technologies used in modern, high-speed computer, communication, control, audio, video, and similar systems. Examples of advanced computing architectures include general-purpose microprocessors and microcomputers either based on complex instruction set or reduced instruction set architectures, and special-purpose computer architectures for applications such as digital signal processing, specialized input/output processors, math processing units, etc. Students need a firm foundation in the basics of computer architectures so that they can develop systems on this knowledge. In addition, they need to learn about the tools of modern digital system design.

3. Essence of the Course:

a) Objectives:

The proposed course has a number of objectives:

- (i) Provide an overview of the basics of computer system and large-scale system architectures.
- (ii) Provide a working knowledge of classical (Von Neumann, Harvard) architectures, CISC, and RISC. Provide an overview of modern architectures including: parallel, superscalar, distributed, systolic, MIMD, etc.
- (iii) Provide a working knowledge of the basic elements required for designing and implementing computer systems.
- (iv) Develop working knowledge of design capture, simulation, and development tools in a large-capacity FPGA development environment.

b) Topical Outline:

- Processor architecture elements: ALU, memory, I/O; registers, control unit, single and multiple processors, bit-slice processors.
- Memory systems. Physical memory; virtual memory; cache.
- I/O systems. Physical, mapped I/O spaces. I/O processors. Interrupts, DMA.
- Software: Modeling of architecture elements; design capture and verification.
- Applications: Interfaces, converters, protocols.

c) Evaluation and Grading Procedures:

Student grades will be based on projects, examinations, homework, and written and oral technical communication.

d) Course Evaluation:

The proposed course will be evaluated based on student evaluations and critical review by engineering faculty.

e) Texts:

E. Karalis, *Digital Design Principles and Computer Architecture*. Prentice-Hall: New Jersey, 1997.

4. Results of Consultations:

a) Consulted Departments: Computer Science

b) Consultants and Consultant Statements: N/A

c) Written Consultations: The course has been discussed with the CS Department in a faculty meeting on October 22, 1998. A written analysis of the proposal will follow.

5. Additional Supporting Information: N/A

6. Catalog Description:

The first course in computer architecture covers principles of computer systems design focusing on hardware elements in bus-based architectures. The course also introduces techniques of large-scale digital system design.

Prerequisite of Digital II required.



*Computer Science Department
Don C. Stone, Ph.D., Chair*

To: John Schmalzel, Electrical and Computer Engineering
From: Don Stone, Computer Science DC5
Date: 3 May 1999
Re: Course proposal

Thank you for consulting with the Computer Science Department on your undergraduate course proposal entitled Computer Architecture I. It looks reasonable to us, and we support it. Our only request (I believe you have already implemented this) is that the course name be changed to be somewhat more informative, specifically to Computer Architecture I: Introduction.

We wish you the best of success in implementing this course!



*Computer Science Department
Don C. Stone, Ph.D., Chair*

To: John Schmalzel, Electrical and Computer Engineering
From: Don Stone, Computer Science DCS
Date: 3 May 1999
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Computer Science Department
Don C. Stone, Ph.D., Chair

To: John Schmalzel, Chair, Electrical Engineering
From: Don Stone, Chair, Computer Science Dec 5
Date: 7 December 1998
Re: Consultation on Computer Architecture I and Computer Architecture II

The Computer Science Department wants to thank you for consulting with us on the proposals for the Electrical Engineering courses Computer Architecture I and Computer Architecture II (and even coming to a department meeting to discuss these proposals). We have put a fairly large amount of time into evaluating these proposals and comparing them with our offerings. The content of the two courses appears reasonable to us, but we feel that the names of the courses need to be changed and that the first should be cross-listed.

We believe that the first course should be named Introduction to Computer Architecture or Foundations of Computer Architecture, since it is essentially a summary or survey version of material that we cover in several courses (primarily Computer Organization and Advanced Computer Architecture), with the addition of a lab. We think it should be cross-listed, giving it a CS number as well as an EE number, and we think that it would be appropriate for a CS faculty member to teach it.

Concerning the second course, we recommend that the course be named Specialized Digital Systems Architecture. We have compared the topics mentioned in the Objectives and Topical Outline sections of the proposal with the coverage of our current Advanced Computer Architecture course and with the coverage of several "classic" computer architecture textbooks, e.g., William Stallings' *Computer Organization and Architecture*, Richard Y. Kain's *Advanced Computer Architecture*, Mehdi Zargham's *Computer Architecture: Single and Parallel Systems*, and Michael Flynn's *Computer Architecture: Pipelined and Parallel Processor Design*. In our current course and in each of these textbooks, we do not find most of the topics in the proposal; instead we find topics related to various types of modern computers, including RISC, superscalar processors, and parallel processing.

c: Laurretta Reeves, Senate Curriculum Committee
Pearl Bartelt, College of Liberal Arts and Sciences
James Tracey, College of Engineering