**Curriculum Proposal**

Please type or select the requested information. Print completed forms, add appropriate paper attachments, and route through MSU's curricular process for recommendations and decisions.

| Proposal #  | 323  |
| Effective Date of Change: | 06-07 |
| Academic Year: | 06-07 |

(Check all that apply):

- College: Science, Engineering and Technology
- Undergraduate
- Department: Electrical and Computer Engineering and T
- Graduate
- Program: Computer Engineering
- CIP #

| Type of Change: | COURSE PROPOSALS |
| Title Current: | New Course |
| Title Proposed: | Computer Hardware and Organization |
| 24-Char. Abbrev.: | Cmpt Hrdwre and Org |

Include a course or program description for the Bulletin (30-40 words maximum for courses, 100 for programs):

This course introduces the computer engineering fundamentals on which current computer systems are based and includes Boolean algebra and simple logic circuits that describe the hardware of modern computer systems. Students gain a deeper understanding of computers by building and microprogramming their own machine. Prerequisite EE 234 and EE 235.

**Rationale or Justification for change:**

This course presents fundamental material which is critical for a computer engineer.

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### General Education Course:

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† For Writing Intensive Courses, attach a description of the kind and quantity of writing.
‡ For Upper Division Courses, include a description of the respects in which it is broad and general rather than narrow and specific, and so suitable as GE.

Attach paper copies of the following:

- a. Syllabus or course outline.
- b. Course's student learning outcomes associated with each GE competency or CD designation.
- c. List of strategies to be used to assess students' achievement of each GE competency or CD designation.

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### Cultural Diversity Course:

(Please check one.)

- □ Core (At least 75% devoted to topics of race, gender, sexual orientation, age, class, and disabilities as they occur in United States Society.)
- □ Related (At least 25% devoted to the above topics or to a global perspective on topics related to African American, Asian, Hispanic, and Native American inhabitants of the United States.)

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### For New Courses***

**Instructional Type:** Lecture

- Course is an elective.
- Course is required for program
  - Computer Engineering
- Pre- or Co-requisites:
  - EE 234 and EE 235

Other courses are being changed or eliminated. (Explain.) Addition of EE 234, EE 235, EE 106 and EE 107

- Fall Semester
- Spring Semester
- Summer Session

- Course content or title is similar to courses in other departments. (Attach copy of letter of agreement with other program(s) contacted. Indicate the nature of the discussions and/or resolution of differences or potential conflicts.)

Attach paper copies of the following:

- a. Syllabus or course outline.
- b. Course's student learning outcomes.
- c. A list of resources required to offer and support this course.
- d. A description of how teaching this course will affect department staffing.
- e. If 400/500 level course, an explanation of added expectations of graduate students.

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**Revised September 2002**
### Signature Page

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**Revised September 2002**
EE 295 Computer Hardware and Organization

Description: This course introduces the computer engineering fundamentals on which current computer systems are based and includes Boolean algebra and simple logic circuits that describe the hardware of modern computer systems. Students gain a deeper understanding of computers by building and microprogramming their own machine.

Course Outcomes:

1. Students will design and simulate using a low level HDL the following computer subsystems:
   - Control Unit
   - ALU Unit:
   - Input/Output Unit
   - Memory Unit
   - Bus Structure
2. Students will become familiar with various ways to design an ALU.
3. Students will be able to show multiple ways for interconnecting system blocks.
4. Students will have an understanding of PLA’s and simulate simple system blocks such as those listed in #5 using a PLA.
5. Students will design and simulate common digital circuits used in microprocessor design including latches, flip flops, comparators, multiplexers, demultiplexers, and ALUs.
6. Students will study different types of memory and determine the implication on system performance.
7. Students will model the memory decoding and input/output system using HDL.
8. Students will program their processor design using Microcode.

Possible Texts:
Computer Systems Architecture by Morris Mano
Resources required to support EE295

c. "Resources to support this course will result from allocation of existing department resources."

d. Staffing resources to support this course will result from allocation of existing department resources."
Tentative Syllabus

Course Number: EE 295
Course Title: Computer Hardware and Organization
Semester: Spring 2007
Class Credits: 3
Class Time: Three – 50 minute lectures per week
Class Location: TBD

Instructor: William B. Hudson, Ph.D.
Office: Trafton South 137
Phone: (507) 389-5639
Email: William.Hudson@mnsu.edu
Office Hours: TBD
Other times by appointment

Course Objectives
1. Students will design and simulate using a low level HDL the following computer subsystems:
   - Control Unit
   - ALU Unit
   - Input/Output Unit
   - Memory Unit
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2. Students will become familiar with various ways to design an ALU.
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6. Students will study different types of memory and determine the implication on system performance.
7. Students will model the memory decoding and input/output system using HDL.
8. Students will program their processor design using Microcode.

Possible Texts:
Computer Systems Architecture by Morris Mano

ABET Course Outcomes are available on the department website

Grading:
1. Homework and Quizzes 125 Points – no more than five homeworks or quizzes maybe missed or viewed as unsatisfactory – or you will fail the course. Failure to complete homework and quizzes in a satisfactory manner will result in a failing course grade
2. Exams 400 points (4 – 100 point exams)
3. Final Examination 125 points
It is expected that the grading scale will follow the typical: A—90%, B—80%, C—70%, etc., but I reserve the right to adjust it as needed.

ADA: It is the intent of the instructor of this course to provide a learning environment that is as conducive to learning and the expression of abilities as is possible. If any student in this course has any condition that requires special accommodation to allow them to master or demonstrate mastery of concepts they are asked to contact the instructor as soon as possible.

Cheating: Cheating will be dealt with in a manner that is consistent with the action. The severity of the penalty may be a simple reprimand or may result in failure of the course. The goal is for you to learn the material. If you are experiencing trouble in the course discuss it with the instructor – learning the material is easier and far more satisfying than cheating.

Documentation: It is expected that documentation and reports (including homework) for this course will be prepared in a manner that would be acceptable in the work environment.

Promptness: It is expected that assignments and obligations will be accomplished in a fashion that would be acceptable in the work environment.

Participation: Conduct consistent with ethical and supportive business practices will be expected. In paraphrasing the Sprint Code of Conduct – be on time for meetings – be prepared for meetings – do not interrupt – criticize ideas not people – respect each other – provide solutions not just problems.

Incompletes: Incompletes are given for circumstances beyond a student’s control. I don’t interpret this to cover poor planning.

Tentative Topic Schedule

(1 period) Course Introduction and Review of Digital
(1 period) Boolean Algebra
(1 period) Full-Adder
(2 periods) State Machines
(1 period) Multiplexers and Demultiplexers
(1 period) Registers
(1 period) Memory Units
(1 period) Review of Data Representation
(2 periods) Register Transfer Language
(2 periods) Hardware Implementations
(1 period) Arithmetic Microoperations
(1 period) Logic Microoperations
(1 period) Shift Microoperations
(1 period) Basic Computer Organization and Design
(1 period) Instruction Codes
(2 periods) Program Organization
(1 period) Direct and Indirect Addressing
(1 period) Memory Reference Instructions
(1 period) Input/Output Instructions
(2 periods) Interrupt Instructions
(2 periods) Control Logic
(1 period) Accumulator Logic
(2 periods) Design and Programming the Basic Computer
(2 periods) Microprogrammed Control
(2 periods) Central Processing Unit
(2 periods) Pipeline and Vector Processing
(2 periods) Computer Arithmetic
(1 period) Input-Output Organization
(1 period) Multiprocessors

(4 periods) examinations
(1 period) final

Total class periods 45

Very little extra time exists to extend coverage on course topics — we will work very hard at staying on schedule. Please come to class prepared.