

**WHEN DOES COMPUTER ARCHITECTURE
EDUCATION BEGIN?
ASSEMBLY LANGUAGE AS COMPUTER ARCHITECTURE**

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FEBRUARY 3, 1996

WHAT ROLE DOES ASSEMBLY LANGUAGE PLAY IN A COMPUTER
SCIENCE CURRICULUM?

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COMPUTER ARCHITECTURE CURRICULUM?

UW DEPARTMENTS

Department of Computer Sciences

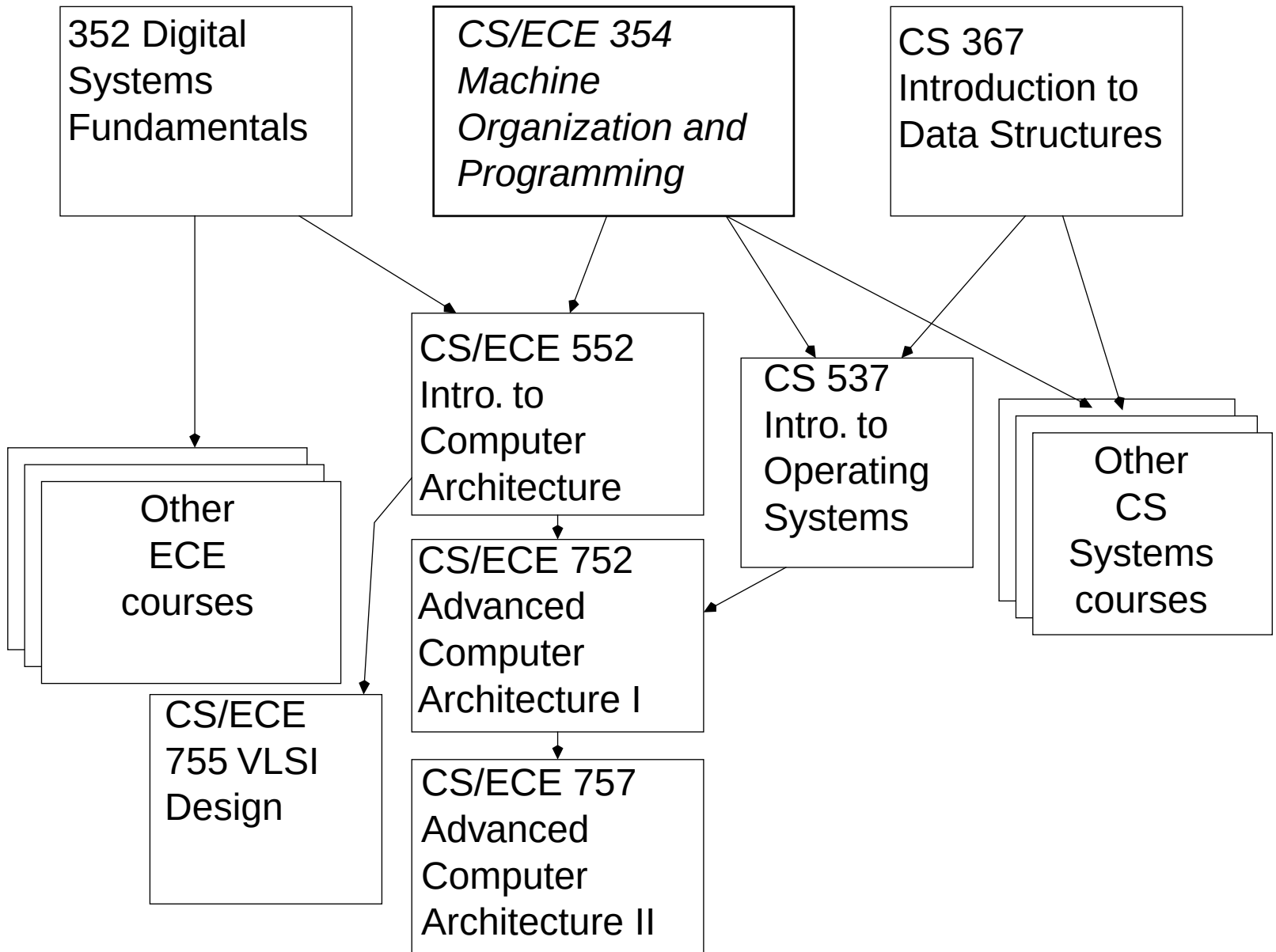
- ❖ Mark Hill
- ❖ Guri Sohi
- ❖ David Wood
- ❖ Jim Goodman

Department of Electrical and Computer Engineering

Includes Computer Engineering Option

- ❖ Jim Smith
- ❖ Yuhon Hu
- ❖ Chuck Kime
- ❖ Kewal Saluja

COURSES



CS/ECE 354

- Prerequisite: familiarity with one HLL.
- An introduction to computer organization using assembly and machine language.
 - ❖ Representation of information
 - ❖ Computer arithmetic
 - ❖ Instruction sets
 - ❖ I/O
 - ❖ Interrupts

Projects involve detailed study and use of a specific computer hardware and software system.

PROBLEMS

- Students come from a variety of places
 - ❖ Future Computer Science majors
 - ❖ Future Computer Engineering majors
 - ❖ Business majors, Physics majors, etc.
- Students have a variety of backgrounds
 - ❖ Some have had 352 Digital Systems Fundamentals
 - ❖ Some have had 367 Data Structures
 - ❖ Some have had neither
- Lots of new ideas are needed all at once
 - ❖ the instruction cycle,
 - ❖ number representation
 - ❖ memory organization
 - ❖ addressing modes
 - ❖ ...

GOALS OF 354

- Understand Hardware/Software Interface
- *Not* to become proficient programmers
- Prepare non-architecture students for advanced courses

FIRST COMPUTER ARCHITECTURE COURSE

IMPLICATIONS OF NEW DIRECTION

- Focus is on Ideas, not Details
- Teach Assembly Language Top-down
- Use abstract computer
- Selectively ignore grungy details of real architectures

ASSEMBLY LANGUAGE IS A TOOL, NOT A SKILL TO BE MASTERED

OUR IMPLEMENTATION

- SAL, MAL, TAL, based on MIPS RISC Architecture
- Simulator SPIM/SAL implements SAL, MAL, TAL.
- Discussion of alternative architectures
- Strong emphasis on representation and arithmetic

ADVANTAGES

- Start with familiar, abstract model: HLL
- Focus is on simple machine having only needed detail
- Introduce features when convenient

SUMMARY

- Assembly language is the tool, not the goal
- This is a Computer Architecture course
- Course (and books) are mis-named
