# CPE 690: Introduction to VLSI Design

Fall 2017

## Lecture 0

## Course Organization & Introduction

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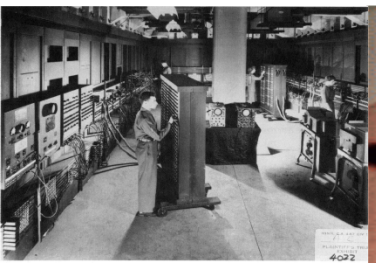

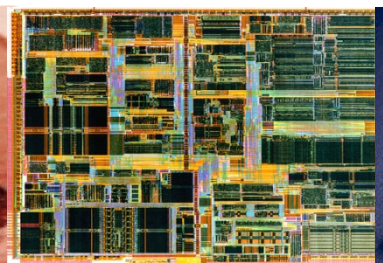
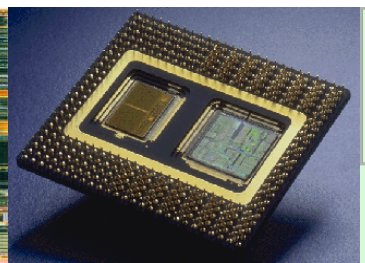
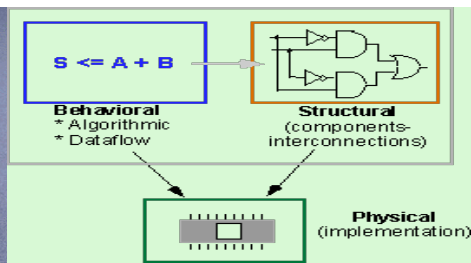

# Course Organization

- Course instructor:

  Prof. Bryan Ackland

  Office: Burchard 211

  Email: backland@stevens.edu

  Phone: (201) 216-8096

- Course web site: on *Canvas*

# Course Organization

- Course schedule:

  Session: *August 28 – December 8*

  Time: Friday 3:00 – 5:30pm

  Location: Babbio 210

- Office Hours:

  Tuesday 10:00 am – 12:00 noon

  Thursday 10:00 am – 12:00 noon

  Other times by appointment (or just drop by)

# Grading & Exam Info

- Grading Information

  -- Homework (20%)

  -- Midterm examination (30%)

  -- Project (20%)

  -- Final examination (30%)

  *Up to 2 extra grade points will be given to students who participate in class*

- Exams will be closed book

- Exam times:

  Midterm: Friday, October 27 @ 3:00 pm.

  Final: *to be announced*

# Homeworks & Project

- Students are allowed to discuss assignments and collaborate on best approach to solve problems.
- Once discussion has taken place, each student must individually prepare his/her own assignment submission
- Is it OK to:
  - ask a fellow student for help in understanding how to attack a problem? YES
  - get together with a group of 2-3 colleagues and share ideas on how to approach problems? YES
  - copy another student's work / answers? NO
  - work with another student(s) to prepare a group solution which each submit independently? NO

# Textbook & References

**Textbook:**

- *CMOS VLSI Design: A Circuits and Systems Perspective (4th edition),* Neil Weste and David Harris, Addison Wesley, ISBN: 0-321-54774-8, 2010

**Recommended references:**

- *Introductory VHDL – From Simulation to Synthesis*, Sudhakar Yalamanchili, Prentice Hall, ISBN 0-13-080982-9, 2001.
- *CMOS: Circuit Design, Layout, and Simulation (2nd edition),* R. Jacob Baker, Wiley-Interscience, ISBN: 0-471-70055-X, 2005
- *Digital Integrated Circuits: A Design Perspective (2nd edition),* Jan Rabaey, Anantha Chandrakasan and Borivoje Nikolic, Prentice Hall, ISBN: 0-130-90996-3, 2003

# Course Objectives & Outline

**Objectives:**

Please visit the web site for detailed course objectives

**Topics (tentative):**

- Challenges of digital VLSI design
- Introduction to manufacturing process
- FPGA's and VHDL design
- MOS devices
- Design metrics: area, speed, power
- Layout and DRC
- Simulation analysis
- CMOS logic gates
- Logical Effort
- Static and dynamic logic
- Power dissipation
- Arithmetic circuits

# Pre-requisite Knowledge

**The course assumes a working knowledge of:**

- Boolean digital logic functions, gates and operators
- Two's complement binary arithmetic
- Basic electronic concepts such as voltage, current, power & charge
- Basic circuit components such as voltage sources, current sources, resistors and capacitors
- Ohms law
- Current-voltage-charge relationship of simple linear capacitors
- Effect of placing simple circuit components in series and in parallel

# Related Journals & Conferences

- Journals:
  - IEEE Trans. on Very Large Scale Integration (VLSI) Systems
  - IEEE Journal of Solid-State Circuits
  - IEEE Trans. on Circuits and Systems (I and II)
  - IEEE Trans. on Computer-Aided Design of Integrated Circuits and Systems
- Conferences:
  - International Solid-State Circuits Conf. (ISSCC)
  - IEEE Symp VLSI Circuits (VLSI)
  - Custom Integrated Circuits Conference (CICC)
  - Design Automation Conference (DAC)
  - International Conference on Computer-Aided Design (ICCAD)

# Reference

The lecture notes are based on the following sources:


- Haibo He, Introduction to VLSI class notes
- R. Jacob Baker, CMOS: Circuit Design, Layout, and Simulation (2nd edition), ISBN: 0-471-70055-X, Wiley-Interscience, 2005
- Jan M. Rabaey, Anantha Chandrakasan, and Borivoje Nikolic, Digital Integrated Circuits: A Design Perspective (2nd edition), ISBN: 0130909963, Prentice Hall, 2003
- Neil H. E. Weste and David Harris, CMOS VLSI Design: A Circuits and Systems Perspective (3rd edition), ISBN: 0-321-14901-7, 2005
- Sudhakar Yalamanchili, Introductory VHDL: From Simulation to Synthesis, ISBN: 0-13-080982-9, Prentice Hall, 2000.