

## EMTM 640

### Dynamics of the Semiconductor Industry – where micro meets nano.

LECTURE 1: Sat. Sept 3, 2011

#### **I. Semiconductor Industry Landscape**

- a. History and background – from micro to nano
- b. Role of Semiconductors

*Assignment 1:* Future application space for semiconductors; or status of the semiconductor industry in China, India (due Sept. 17, 2011)

LECTURE 2: Sat. Sept 17, 2011

#### **I. Semiconductor Industry Landscape (part 2)**

- c. Moore's Law and Scaling
- d. Challenges of the Semiconductor Industry
- e. ITRS Roadmap

#### **II. Changing Business Models**

- a. Types of Semiconductor Companies
- b. Global Trends
- c. Horizontal Segmentation and Virtual IDMs
- d. Global Unichip Corp. – case study

*Assignment 2:* see handouts (due Oct. 29)

LECTURE 3: Friday Oct. 1, 2011

#### **III. Case study:** Intel and the future of the microprocessor business

#### **IV. Fabless Industry**

- a. Fabless model
- b. The Value Chain
- c. Development Activities and Lifecycle

LECTURE 4: Sat. Oct. 15, 2011

#### **V. Chip Design and Implementation Approaches**

- a. Design Flow
- b. Choice of technology

- c. Implementation approaches (Full custom, semi-custom, FPGA)
- d. Sourcing models

**VI. Case study:** Qualcomm and Rambus

Examples of a Fabless and IP company – differences and similarities.

LECTURE 5: Sat. Oct. 29, 2011

**VII. Understanding Modern Semiconductor Devices**

- a. Semiconductor material
- b. MOS Transistor Structure and Operation
- c. CMOS, Diodes, LEDs, Solar cells (photovoltaics), lasers.

Video of Microfabrication Technology

Guest Lecture: Hans Schmitz, Hans.Schmitz@microsemi.com

*Assignment 3* (due Nov. 12)

LECTURE 6: Sat. November 12, 2011

**VIII. Design approaches**

- a. Full Custom
- b. Semi-custom
- c. FPGA

Guest Speaker: Hans [Schmitz](#), “Implementation approaches and FPGAs”.

**IX. Technology and Manufacturing of Semiconductor devices**

- a. Clean rooms and fabs
- b. Process overview
- c. Lithography
- d. Etching, doping and deposition
- e. CMOS process flow
- f. Economics of IC fabrication