MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF ARMENIA

STATE ENGINEERING UNIVERSITY OF ARMENIA

CONFIRMED BY

EXECUTIVE DIRECTOR OF

"SYNOPSYS ARMENIA" CJSC SG

H. MUSAYELYAN

"____" _____2005

CONFIRMED BY

VICE RECTOR OF STATE ENGENEERING

UNIVERSITY OF ARMENIA

R. AGHGASHYAN

"____" _____2005

INTEGRATED CIRCUITS FABRICATION

COURSE PROGRAM

INDEX: **20.02, 22.05**

SPECIALIZATION **"VLSI DESIGN"**

YEREVAN 2005

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The program has been discussed and approved by:

- At the sitting of the SEUA interdepartmental Chair of **"Microelectronic Circuits and Systems"** acting on the basis of "SYNOPSYS SRMENIA" CJSC SG
  Protocol No. 5 of. 22.02.2005

- At the sitting of the **Computer Systems and Informatics Department** authorities
  Protocol No. 4 of. 28.02.2005

- At the sitting of the **Cybernetics Department** authorities
  Protocol No. 4 of. 28.02.2005

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INTRODUCTION

Course program on **“Integrated Circuits Fabrication”** is assigned for undergraduate education on “**VLSI Design”** specialization and is taught on the 8th semester (4 year’s 2nd semester).

The course duration is 16 hours, lectures volume is 16 hours.

COURSE GOALS AND OBJECTIVES

The goal of the course is to teach the future designers the fabrication aspects of up-to- date integrated circuits as well as to promote an interest in life-long learning together with the ability to advance professionally.

The main objectives of the course are:

- The study of basics of IC fabrication technology.
- The study of interface between designer and process engineer.

SYLLABUS

1. LECTURES (16 hours)

1.1. Introduction (2 hours).

The IC fabrication general process flow diagram. Process modules (brief overview). Features of IC fabrication process. Modern cleanrooms. Limitations of fabrication techniques.

1.2. IC fabrication process (5 hours).

Simplified CMOS IC process flow and fabrication steps (brief overview). Lithography as a basic method of fabrication process. Comparative analysis of lithographic methods . Resolution and accuracy. Photolithography. Typical operations. Photo masks and fabrication methods. Advanced lithography. Technological equipment.

1.3. Integrated circuits packaging (4 hours).

The role of IC package. Packages classification and materials. Packaging methods and technology. Thermal consideration in packaging. Interconnect levels (wire bonding, TAB process, flip-chip technique). High-performance packages.

1.3. Fabrication constraints on layout (2 hours).

Common design rules. Scalable and micron design rules. Resolution constraints and alignment/overlap constraints. Design rules the interface between designer and process engineer.

1.4. IC testing and yield analysis (3 hours).

Measurements and control for IC characterization. Accelerated tests. Defects and yield analysis of chips. Reliability and degradation of IC. The features of statistical process control for IC fabrication. Role of models in microelectronics technology.

METHODIC PROVISION OF THE COURSE

To study the course the necessary list of references is given below.

The course program is compiled taking into account that the following courses had been studied beforehand:

- “Semiconductor technology”
- “ Semiconductor devices”
- “Physical Fundamentals of Microelectronics or “Solid State Electronics Fundamentals”

Understanding of the course is the basis for the further specialized subjects destined by the postgraduate educational plan of “VLSI Design” specialization.

REFERENCIES

Main

1. P. Girffin, Silicon VLSI Technology: Fundamentals, Practice, and Modeling, McGraw-Hill, New York, 1998.
2. S. Wolf. Silicon Processing for the VLSI ERA, Vol.2: Process Integration. Lattice Press. California, 1990.
3. S. Wolf. Silicon Processing for the VLSI ERA, Vol.: The Submicron MOSFET. Lattice Press. California, 1995.

Additional

4. S. Sze. VLSI Technology, McGraw-Hill, New York, 1988.
5. S. Wolf. Silicon Processing for the VLSI ERA, Vol.1: Process Technology. Lattice Press. California, 1986.