

ECE 487

Semiconductor Factory Design and Operation

Overview

Course Catalog Description: A detailed overview of the operations of an integrated circuit fabrication facility using Sandia's Microelectronics Development Laboratory as a prototype. Topics include building facilities, equipment, software tracking and personnel

Prerequisites: basic understanding of semiconductor device operation

Textbook: There is no textbook covering all of the material. The material comes from PowerPoint notes from each lecturer

Class Goals: The objective of this course is to provide a detailed overview of the operations and layout of an integrated circuit fabrication facility. Operations topics include basic wafer fabrication steps, tool selection, wafer tracking and handling, WIP, equipment and process integration, process ramp-ups, operator protocol, staffing, training, and best-practices. Fab (plant-level) design topics include costing, overall equipment effectiveness, construction materials, contamination control, air handling, and factory integration. Utility topics include ultra-pure water, bulk and specialty gases, electricity minimization, waste stream design, recycling, and ESH requirements. Invited lecturers from leading IC companies and research labs will provide information on state-of-the-art IC manufacturing technology that is not generally available in the literature or in textbooks.

Course Coordinator: Prof. Payman Zarkesh-Ha

Table I: Objectives, Implementation, and Assessment

Objectives		Implementation	Assessment	A	B	C	D	E	F	G	H	I	J	K
O ₁	Understand the basic semiconductor fabrication operations and process integration	9 hrs. lecture in 1 st three weeks	HW 1	X	X									
O ₂	Understand the main issues in design of a semiconductor factory including cost, materials, contamination control, and factory integration	18 hrs. lecture in weeks 4-9	HW 2	X	X	X		X						X
O ₃	Understand the issues related to utility including pure water, gases electricity, waste, and recycling	15 hrs. lecture in weeks 10-14	HW 3	X	X	X		X			X			X
O ₄	Get information on state-of-the-art IC manufacturing technology through invited lectures from leading IC companies and research labs	6 hrs. lecture in weeks 15-16	HW 4	X		X			X					X

