

PROFESSOR'S NAME	Prof. Parasuraman S
DEPARTMENT	Department of Metallurgy and Material Science
INSTITUTE	Indian Institute of Technology Madras
COURSE OUTLINE	The course is intended to provide an understanding of current fabrication practices used in the semiconductor industry, along with the challenges and opportunities in Device Fabrication. It caters to UG and PG students from diverse backgrounds such as Chemical, Electrical, Mechanical, Metallurgy, Materials Science, Physics, and Chemistry. The course provides an overview on integrated circuit fabrication along with practices and challenges to continue to satisfy Moore's law.

COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1.	L1	Metals, semiconductors, and insulators
2.	L2	Introduction to semiconductors
3.	L3	Density of states and Fermi-Dirac statistics
4.	L4	Assignment 1 - Bonding, DOS, and Fermi statistics
5.	L5	Intrinsic semiconductors
6.	L6	Intrinsic semiconductors - conductivity
7.	L7	Assignment 2 - Intrinsic semiconductors
8.	L8	Extrinsic semiconductors
9.	L9	Extrinsic semiconductors - Fermi level
10.	L10	Extrinsic semiconductors - conductivity
11.	L11	Assignment 3 - Extrinsic semiconductors

12.	L12	Metal-semiconductor junctions
13.	L13	Assignment 4 - Metal-semiconductor junctions
14.	L14	pn junctions in equilibrium
15.	L15	pn junctions under bias
16.	L16	pn junction breakdown and heterojunctions
17.	L17	Assignment 5 - pn junctions
18.	L18	Transistors
19.	L19	MOSFETs
20.	L20	Assignment 6 - transistors
21.	L21	Optoelectronic devices: Introduction
22.	L22	Optoelectronic devices: LEDs
23.	L23	Optoelectronic devices: LASERs
24.	L24	Optoelectronic devices: photodetector
25.	L25	Optoelectronic devices: solar cells
26.	L26	Assignment 7 - optical properties
27.	L27	Assignment 8 - optoelectronic devices
28.	L28	Semiconductor manufacturing: Introduction
29.	L29	Si wafer manufacturing
30.	L30	IC device manufacturing: overview
31.	L31	Layering: thermal oxidation
32.	L32	Doping: thermal and ion implantation
33.	L33	Lithography
34.	L34	Etching and deposition (growth)
35.	L35	Metallization and polishing
36.	L36	Process and device evaluation
37.	L37	Productivity and process yield
38.	L38	Clean room design and contamination control
39.	L39	Devices and IC formation

40.	L40	IC circuit logic and packaging
41.	L41	Live Session 26-09-2019

List of reference material/ books:

Name and contact details of two referees for the course: