EE/MSE 528:
Physics and Modeling of VLSI Fabrication

Syllabus, Spring 2007 (Dunham)

http://dunham.ee.washington.edu/ee528

- Review of IC Fabrication Processes (2 lectures; Chapters 1, 2, and 4)
  - Basic Process Steps
  - CMOS fabrication
  - Self-aligned processes
- Diffusion (4 lectures; Chapters 3 and 7)
  - Point defects – interstitials and vacancies
    - Structure and charge states
    - Self-diffusion
  - Coupled diffusion of dopants with point defects
    - Effects of Fermi level
    - Non-equilibrium effects
  - Clustering and Precipitation
  - Stress Effects
- Film Growth (3 lectures; Chapters 6 and 7)
  - Oxidation
    - Oxidation kinetics (thin oxides, stress effects)
    - Oxidation enhanced (and retarded) diffusion (OED)
  - (Oxy)Nitridation
  - Silicidation
- Ion Implantation (3 lectures; Chapter 8)
  - Implantation Modeling
    - Electronic and nuclear stopping
    - Channeling
  - Damage Annealing
    - Transient enhanced diffusion (TED)
- Photolithography (2 lectures; Chapter 5)
  - Exposure
  - Development
  - Enhancement techniques (proximity correction, phase shift masks, surface imaging, immersion, etc.)
  - Advanced methods (Extreme UV, Electron beam projection (SCALPEL), X-ray)
- Deposition and Etching (4 lectures; Chapters 9, 10 and 11)
  - PVD (evaporation, sputtering)
  - Chemical vapor deposition (CVD)
  - Electroplating
  - Reactive ion etching (RIE)
  - Chemical-mechanical polishing (CMP)