ECE 4381 VLSI Processing

Credit / Contact hours: 3 / 3 per week

Course coordinator: Sergey Nikishin

Textbook(s) and/or other required material: "Fabrication Engineering at the Micro- and Nanoscale", fourth edition, by S. A. Campbell (Oxford, 2013); ISBN 978-0-19-986122-4

Additional References:

The review papers from Proceedings of IEEE and IEEE Journals, The Journal of Applied Physics and Applied Physics Letters, The Journal of Crystal Growth, The Journal of Vacuum Science and Technology A & B, Science, Proceedings of SPIE, and Proceedings of MRS.

Catalog description: Introduction to semiconductor processing (3:3:0). Introduction to the physical principles, techniques, and technologies involved with the fabrication of very large scale integrated circuits (VLSI).

Pre-requisite(s): Foundational understanding of electricity and magnetism, basic chemistry, some knowledge of basic quantum and semiconductor physics.

Co-requisites (if any): None

Designation: Required

Course Objectives: Introduction to the physical principles, techniques, and technologies involved with the fabrication of very large scale integrated circuits (VLSI). Students will learn:

Basic physics, chemistry, and engineering of semiconductor materials processing.

Fundamentals of methods used in producing integrated circuits.

State of the art methods used in micro- and nanoelectronics.

ABET Student Outcomes addressed in course: a, e, f, and k.

Topics covered:

Semiconductor Substrates – 3 hours

Diffusion – 4 hours

Thermal Oxidation – 3 hours

Ion Implantation – 3 hours

Rapid Thermal processing – 2 hours

Vacuum Science, Physical Deposition, and Plasmas – 5 hours

Lithography – 4 hours

Etching (dry and wet) – 3 hours

Chemical Vapor Deposition and Epitaxial Growth – 4 hours

Integrated Solid State Devices – 1 hour