MICROELECTRONIC ENGINEERING

Enrollment and Graduation Data

Fall 2018 Enrollment – 46

2017-18 Graduates – 18 BS degrees conferred

Program Educational Objectives

The microelectronic engineering core program at RIT offers a comprehensive curriculum with a blend of theoretical, laboratory and experiential learning. The program has been carefully crafted to prepare students for immediate entry into the semiconductor industry workplace or to pursue advanced graduate study. The unique qualifications of our graduates are highly sought after.

The educational objectives of the microelectronic engineering major are to produce graduates who have the following skills or characteristics:

- A sound knowledge of the fundamental scientific principles involved in the operation, design, and fabrication of integrated circuits.
- A comprehensive understanding of relevant technologies such as integrated circuit process integration and manufacturing. This includes nanolithography and the application of engineering principles to the design and development of current and future semiconductor technologies.
- A professional approach to problem solving, using analytical, academic, and communication skills effectively, with special emphasis on working in teams.
- An enthusiasm for learning and the continuous improvement of skills throughout one's career, exemplified by learning about emerging technologies and adapting to and accepting change within the field.
- A desire to achieve leadership positions in industry or academia.
- A breadth of knowledge, including the multidisciplinary nature of microelectronic engineering as well as the broad social, ethical, safety, and environmental issues within which engineering is practiced.

Student Outcomes

The Microelectronic Electronic engineering faculty in conjunction with its constituents fulfills the BS Microelectronic Engineering Program Educational Objectives by defining specific Program Outcomes to be achieved by the curriculum:

- Understand the fundamental scientific principles governing solid state devices and their integration into modern integrated circuits.
- Design and conduct a sequence of processing steps to fabricate a solid state device to meet a set of geometric, electrical, and/or processing parameters.
- Acquire and analyze experimental electrical data from a solid-state device to extract performance parameters for comparison to modeling parameters used in the device design
- Conceive and conduct a designed experiment to characterize and/or improve a process utilized in IC fabrication

- Communicate the results of an in-depth engineering research experience using techniques appropriate for oral, poster, and paper presentations at technical conferences
- Enter the job market or graduate school with the required engineering co-op experience.
- Understand the relevance of a process or device, either proposed, past or existing, to current manufacturing practices.
- Understand, characterize, and modify current lithographic materials, processes, and systems to meet imaging and/or device patterning requirements.
- Appreciate the multidisciplinary nature of the field and the inherent trade-off between breadth and depth of knowledge.

One of the great challenges in integrated circuit manufacturing is the need to draw on scientific principles and engineering developments from such an extraordinarily wide range of disciplines. The design of microelectronic circuits requires a sound knowledge of electronics and circuit analysis. Optical lithography tools, which print microscopic patterns on wafers, represent one of the most advanced applications of the principles of Fourier optics. Plasma etching involves some of the most complex chemistry used in manufacturing today. Ion implantation draws upon understanding from research in high-energy physics. Thin films on semiconductor surfaces exhibit complex mechanical and electrical behavior that stretches our understanding of basic materials properties.

Scientists and engineers who work in the semiconductor field need a broad understanding of and the ability to seek out, integrate, and use ideas from many disciplines. The major provides the broad interdisciplinary background in electrical and computer engineering, solid-state electronics, physics, chemistry, materials science, optics, and applied math and statistics necessary for success in the semiconductor industry.