Engineering Faculty Document No. EFD 79-22
February 25, 2022

Memorandum

To: The College of Engineering Faculty

From: The Elmore Family School of Electrical and Computer Engineering

Re: new Concentration in Microelectronics and Semiconductors for Computer Engineering

The faculty of the Elmore Family School of Electrical and Computer Engineering has approved the following new concentration from the College of Engineering. This action is now submitted to the Engineering Faculty with a recommendation for approval.

Description: Semiconductor chips form the backbone of the entire computing and electronics industries. This concentration in Microelectronics and Semiconductors provides transciptable, specialized training in the design and manufacturing of advanced semiconductor chips with coursework focused on semiconductor devices, integrated circuits, integrated systems, and more.

Reasons: Advanced semiconductor chips form the backbone of the entire computing and electronics industries. A worldwide shortage of semiconductors has brought into sharp focus the need for more design, engineering, and manufacturing capacity (especially domestically in the US) to keep pace with the demand for semiconductor-based products and services. Thanks to this demand, the semiconductor industry needs a lot more workforce-ready engineers (50,000+ new jobs in the coming decade, as per some industry forecasts) to ramp up such capacity and the proposed minor will help position Purdue as a national leader in workforce development in this crucial field.

Milind Kulkarni
Associate Head of Teaching and Learning
Professor of Electrical and Computer Engineering

Microelectronics and Semiconductor Concentration for Computer Engineering

Electives (9 credits):

Must complete a minumum of 9 credits from the Elective courses below. VIP (Vertically Integrated Projects) and ECE 49600 Undergraduate Projects may be taken for a maximum of 3 credits toward the concentration upon approval of the Associate Head of Undergradute Programs or Associate Head of Teaching and Learning.

ECE 30500 Semiconductor Devices

ECE 33700 ASIC Design Laboratory

ECE 43700 Computer Design And Prototyping

ECE 45500 Integrated Circuit Engineering

ECE 45600 Digital Integrated Circuit Analysis And Design

ECE 49600 Electrical And Computer Engineering Projects

ECE 55700 Integrated Circuit Fabrication Laboratory

ECE 55900 MOS VLSI Design

ECE 56800 Embedded Systems

ECE 59500 Selected Topics in Electrical Engineering

[Right]   Qualifying Titles: Qualifying Titles: CMOS Analog IC Design (3 credits); Digital Systems Design Automation (3 credits); Microfabrication Fundamentals (1 credit); Semiconductor Fundamentals (1 credit); Semiconductor Manufacturing (1 credit); Theory & Practice of Solar Cells: A Cell to System Perspec (1 credit); MEMS-I: Microfabrication and Materials for MEMS (1 credit); Fundamentals of Current Flow (1 credit); Introduction to Quantum Transport (1 credit); Boltzmann Law: Physics to Computing (1 credit); Primer on Semiconductors (1 credit); Essentials of Transistors (1 credit); Advanced Lithography (1 credit)

VIP 37920 Junior Participation In Vertically Integrated Projects (VIP)

VIP 47920 Senior Participation In Vertically Integrated Projects (VIP)

Concentration in Microelectronics and Semiconductors for Bachelor of Science in Computer Engineering

Topic focus of the concentration?
The concentration in Microelectronics and Semiconductors provides a transciptable, specialized training in advanced semiconductor chips which forms the backbone of the entire computing and electronics industry.

Proposing [Sub]Area:
Vijay Raghunathan proposed the concentration for the Computer Engineering area.

Target Degree:
BSCmpE

Concentration Requirements:
Choose at least 9 credit hours from the following courses:

      ECE 30500: Semiconductor Devices [3 credits]
      ECE 33700: ASIC Design Lab [2 credits]
      ECE 43700: Computer Design and Prototyping [4 credits]
      ECE 45500: Integrated Circuit Engineering [3 credits]
      ECE 45600: Digital Integrated Circuit Analysis and Design [3 credits]
      ECE 55700: Integrated Circuit Fabrication Laboratory [3 credits]
      ECE 55900: MOS VLSI Design [3 credits]
      ECE 59500: CMOS Analog IC Design [3 credits]
      ECE 59500: Digital Systems Design Automation [3 credits]
      ECE 56800: Embedded Systems [3 credits]
      ECE 59500: Microfabrication Fundamentals [1 credit]
      ECE 59500: Semiconductor Fundamentals [1 credit]
      ECE 59500: Semiconductor Manufacturing [1 credit]
      ECE 59500: Theory & Practice of Solar Cells: A Cell to System Perspec [1 credit]
      ECE 59500: MEMS-I: Microfabrication and Materials for MEMS [1 credit]
      ECE 59500: Fundamentals of Current Flow [1 credit]
      ECE 59500: Introduction to Quantum Transport [1 credit]
      ECE 59500: Boltzmann Law: Physics to Computing [1 credit]
      ECE 59500: Primer on Semiconductors [1 credit]
      ECE 59500: Essentials of Transistors [1 credit]
      ECE 59500: Advanced Lithography [1 credit]

      With Approval of the Associate HEa dof Undergraduate Programs or Associate Head of Teaching and Learning, can include up to 3 hours of:
      •VIP 37920 [2 credits]
      •VIP 47920 [2 credits]
      •ECE 49600 [1-3 credits]