PURDUE UNIVERSITY | Elmore Family School of Electrical and Computer Engineering

Engineering Faculty Document No. EFD 70-22
February 10, 2022

Memorandum

To: The College of Engineering Faculty

From: The Elmore Family School of Electrical and Computer Engineering

Re: new Microelectronics and Semiconductors minor

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

Description: The Microelectronics and Semiconductors minor provides transciptable, specialized training to students interested in joining the microelectronics and advanced semiconductors workforce.

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.

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Professor of Electrical and Computer Engineering

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Microelectronics and Semiconductors Minor

Requirements for the Minor (18 credits)

For students to complete the Microelectronics and Semiconductor minor, they must choose either the Microelectronics track or the Semiconductor track. Once the cores for their chosen track is finished, they choose from the common list of electives reaching a minimum of 18 credits.

Required Cores for the Microelectronics Track (10 credits)

Students choosing the Microelectronics track of the MESC minor must complete the following courses:

ECE 20001 Electrical Engineering Fundamentals I
ECE 20007 Electrical Engineering Fundamentals I Lab
ECE 27000 Introduction To Digital System Design
ECE 33700 ASIC Design Laboratory

Required Cores for the Semiconductors Track (10 credits)

Students choosing the Semiconductors track of the MESC minor must complete the following courses:

ECE 20001 Electrical Engineering Fundamentals I
ECE 20002 Electrical Engineering Fundamentals II
ECE 20007 Electrical Engineering Fundamentals I Lab
ECE 30500 Semiconductor Devices

Electives (8 credits)

Regardless of which track, students must complete a minimum of 8 credits from the below courses:

ECE 20002 Electrical Engineering Fundamentals II
ECE 27000 Introduction To Digital System Design
ECE 30500 Semiconductor Devices
ECE 33700 ASIC Design Laboratory
ECE 36200 Microprocessor Systems And Interfacing
ECE 43700 Computer Design And Prototyping
ECE 45500 Integrated Circuit Engineering
ECE 45600 Digital Integrated Circuit Analysis And Design
ECE 55700 Integrated Circuit Fabrication Laboratory
ECE 55900 MOS VLSI Design
ECE 59500 Selected Topics In Electrical Engineering
[Right] Qualifying Titles: CMOS Analog IC Design [3 credits]; Digital Systems Design Automation [3 credits]; Embedded Systems [3 credits]; Microfabrication Fundamentals [1 credit]; Semiconductor Fundamentals [1 credit]; Semiconductor

Manufacturing [1 credit]; Theory & Practice of Solar Cells: A Cell to System Perspective [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]

Disclaimer

The student is ultimately responsible for knowing and completing all degree requirements.

The myPurduePlan powered by DegreeWorks is the knowledge source for specific requirements and completion.

APPLICATION TO MINOR IN MICROELECTRONICS AND SEMICONDUCTORS

General Requirements:

- Before applying for the MESC minor, students must have completed MA 16100/16500, MA 16200/16600, PHYS 17200 (or their equivalents), and CS 15900/24000, with a minimum grade of C- in each course. In addition, the student's cumulative GPA at the time of admission to this minor must be at least 3.00.
- Students must apply for the MESC minor in person in MSEE 140 either during walk-ins or by appointment.
- Except for ENGR courses, all pre-requisites for the courses listed for the minor must be met in order to enroll in them. Transfer and AP credit will be accepted for the above-mentioned pre-requisites.

Once all the above requisites are met, the MESC minor will be added to the students record, and they must proceed to meet the following requirements:

- A minimum overall GPA of 3.00 is required in ECE courses to qualify for the minor. Approval of the MESC minor may be revoked if the ECE GPA falls below 3.00.
- Enrollment in all ECE courses is subject to space availability and students must request an override through the Scheduling Assistant during the registration process, which may be held until 'Open Registration'.
- ECE 59500 Natural Language Processing
- ECE 59500 Introduction to Data Mining

ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING MINOR APPLICATION

Pre-Application Requirements (C- or higher required in each)

- Calculus I met by _____ (Course) with a grade of _____
- Calculus II met by _____ (Course) with a grade of _____
- Physics I met by _____ (Course) with a grade of _____
- CS 15900/24000 met by _____ (Course) with a grade of _____

Name: | PUID: | Email:

Expected Graduation Date: | Home School/Program:

By signing, I agree to meet the requirements stated above to qualify for a minor in Artificial Intelligence and Machine Learning.

Student Signature: | Date:

Approved by ECE Undergraduate Advisor: | Date:

Microelectronics and Semiconductors Minor Requirements

The total credit hour requirement for the minor is 18 credit hours. ***Students pick either a Microelectronics track or a Semiconductors track*** and follow the course requirements for their selected track.

Required Core for the Microelectronics Track [10 credit hours]

ECE 20001: Electrical Engineering Fundamentals I [3 credits] – with FYE waived as a pre-req.
ECE 20007: Electrical Engineering Fundamentals I Lab [1 credit]
ECE 27000: Introduction to Digital System Design [4 credits]
ECE 33700: ASIC Design Lab [2 credits]

Required Core for the Semiconductors Track [10 credit hours]

ECE 20001: Electrical Engineering Fundamentals I [3 credits] -- with FYE waived as a pre-req.
ECE 20007: Electrical Engineering Fundamentals I Lab [1 credit]
ECE 20002: Electrical Engineering Fundamentals II [3 credits]
ECE 30500: Semiconductor Devices [3 credits]

Select from the following electives (common to both tracks) to reach at least 18 credit hours:

ECE 20002: Electrical Engineering Fundamentals II [3 credits] – if not done as core
ECE 27000: Introduction to Digital System Design [4 credits] – if not done as core
ECE 33700: ASIC Design Lab [2 credits] – if not done as core
ECE 30500: Semiconductor Devices [3 credits] – if not done as core
ECE 36200: Microprocessor Systems and Interfacing [4 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 Perspective [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]
ECE59500: Primer on Semiconductors [1 credit]
ECE 59500: Essentials of Transistors [1 credit]
ECE 59500: Advanced Lithography [1 credit]
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Notes: Course list is subject to change with faculty approval.