CHIP-SCALE INTEGRATION MAJOR

Program Curriculum

Code	Title	Credits
Degree Core Requirements		
ECE 1004	Introduction to ECE Concepts (C)	3
ECE 2024	Circuits and Devices (C)	3
ECE 2514	Computational Engineering	3
ECE 2544	Fundamentals of Digital Systems (C)	3
ECE 2564	Embedded Systems (C)	3
ECE 2804	Integrated Design Project (C)	2
ECE 3514	Data Structures & Algorithms (C-)	3
ECE 3574	Applied Software Design	3
Subtotal		23
Major Requirements		
ECE 2214	Physical Electronics (C)	3
ECE 2714	Signals and Systems (C)	3
ECE 3504	Principles of Computer Architecture (C-)	3
ECE 3544	Digital Design I (C-)	4
ECE 3004	AC Circuit Analysis	3
ECE 3074	AC Circuit Analysis Laboratory	1
ECE 4540	VLSI Circuit Design	3
ECE 4514	Digital Design II	4
Subtotal		24
Additional Course Requirements		
MATH 2114	Introduction to Linear Algebra	3
MATH 2204	Introduction to Multivariable Calculus	3
STAT 4714	Probability and Statistics for Electrical Engineers	3
MATH 2534	Introduction to Discrete Mathematics	3
Subtotal		12
Secondary Focus Area Requirements		
See secondary focus area requirements below.		9
Subtotal		9
Free Elective Credits		
Select remaining credits required for the degree:		10
Subtotal		10
Pathways to General Education		
Pathways Concept 1 - Discourse		
ENGL 1105	First-Year Writing (1F)	3
ENGL 1106	First-Year Writing (1F)	3
ECE 4805 & ECE 4806	Senior Design Project and Senior Design Project (1A)	6
Pathways Concept 2 - Critical Thinking in the Humanities		
Select six hours in Pathway 2 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G02)		6
Pathways Concept 3 - Reasoning in the Social Sciences		
Select six hours in Pathway 3 (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G03)		6
Pathways Concept 4 - Reasoning in the Natural Sciences		
PHYS 2305	Foundations of Physics	4
PHYS 2306	Foundations of Physics	4
Pathways Concept 5 - Quantitative and Computational Thinking		
MATH 1225	Calculus of a Single Variable (5F)	4
MATH 1226	Calculus of a Single Variable (5F)	4
MATH 2214	Introduction to Differential Equations (5A)	3
Pathways Concept 6 - Critique and Practice in Design and the Arts		
Select three hours in Arts Pathway 6a (https://catalog.vt.edu/course-search/?attrs_pathways=attrs_pathways_G06A)		3
ENGE 1215 & ENGE 1216	Foundations of Engineering and Foundations of Engineering (6D)	4
Pathways Concept 7 - Critical Analysis of Identity and Equity in the United States		
Pathways 7 should be double counted with either Pathways 2, 3 or 6a to avoid taking any additional credit hours.		
Subtotal		50
Total Credits		**128**

Secondary Focus

The Chip-Scale Integration Major requires 9 credits for a secondary focus area. Students have the flexibility to choose any 3 ECE courses (9 credits) at the 3xxx level or 4xxx level to meet the secondary focus requirements as long as at least one course (3 credits) is at the 4xxx level and the courses do not duplicate major courses. Alternatively, students may seek an approved individualized secondary focus. See the requirements below for more information.

Secondary Focus Requirement

The ECE secondary focus requirement consists of 3 ECE courses (9 credits) at the 3xxx level, 4xxx level, or 5xxx level where at least one course (3 credits) is at the 4xxx or 5xxx level. **None of the 3 courses can duplicate a course from the student's major.** All courses used for secondary focus must be taken on an A-F basis. For purposes of satisfying the secondary focus requirements, the sum of the number of hours taken from ECE 4974 Independent Study and ECE 4994 Undergraduate Research cannot exceed 6 credits.

The following courses are also included in the secondary focus:

Code	Title	Credits
AOE 4654	Space Weather: The Solar Wind and Magnetosphere	3
AOE 4674	Upper Atmosphere/Ionosphere Space Weather	3
CS 3214	Computer Systems	3
CS 4224	Linux Kernel Programming	3
CS 4264	Principles of Computer Security	3
CS 4504	Computer Organization	3
CS 4824	Machine Learning	3

The following courses **cannot** be used toward secondary focus:

Code	Title	Credits
ECE 3054	Electrical Theory	3
ECE 3074	AC Circuit Analysis Laboratory	1
ECE 3254	Industrial Electronics	3
ECE 3274	Electronic Circuits Laboratory II	1
ECE 3354	Electric Power Engineering Laboratory	1

ECE 3524	Introduction to Unix for ECE	2
ECE 4944	Cybersecurity Seminar	1

Individualized Secondary Focus

(Must be preapproved by ECE Department)

Electrical and computer engineering has applications across a wide variety of fields, such as medicine, human-computer interaction, finance, and entertainment. People with ECE degrees can be entrepreneurs, patent lawyers, policy makers, and business executives. The individualized secondary focus helps students pursue these interests. This option can be used in place of a pre-defined, in-department secondary focus.

The individualized secondary focus typically is pursued via an already defined university-approved program such as a degree, major, minor, or certificate that the student has declared. Students are encouraged to select courses from these programs, subject to the guidelines below.

1. To begin this process, students must first meet with their academic advisor.
2. The student must complete a brief proposal form describing the expected added value to their major. This includes a narrative about how these courses support the student's career goals and ability to achieve their professional aspirations. This proposal must be approved by the Director of Undergrad Program or designee.
3. Individualized secondary focus plans must include 3 courses within the following parameters:
   a. None of the courses may duplicate the student's ECE major requirements.
   b. None of the courses can be at the 1xxx level (1xxx courses required for university-approved programs, e.g. minors, can be used for a student's free electives).
   c. A maximum of one course can be at the 2xxx level, and only if it is a requirement of a university approved program, or if the course is a prerequisite to one or more of the other two courses in the individualized secondary focus.
   d. A minimum of one course must be at the 4xxx level.
4. If the set of courses is part of an already defined university program, the student should attach documentation to the proposal form.
5. If the set of three courses are not part of an already defined university-approved program, the student must also obtain written approval from the department that houses the courses.
6. It is the student's responsibility to ensure that the set of courses is available to be taken in a timely manner. The ECE department is not responsible for changes of programs elsewhere in the university.

Graduation Requirements

Each student must complete at least 128 semester credit hours with a minimum overall GPA of 2.00 and a minimum in-major GPA of 2.00. In determining the Chip-Scale Integration in-major GPA, all ECE courses, including repeats, are used.

General Information about Checksheet

Course offerings are subject to change and the availability of sufficient resources. Students should confirm course offerings in advance with their department.

Pathways to General Education (Pathways)

Consult the pathways courses table: https://www.pathways.prov.vt.edu/about/table.html. Pathways courses need to be completed prior to graduation.

Electives

The Chip-Scale Integration Major requires 5 hours of free electives. Only free electives may be taken under the P/F grading option. Students are encouraged to use free elective credits to provide depth in their major or secondary focus.

Change of Major Requirements

Please see: https://eng.vt.edu/em (https://eng.vt.edu/em/)

Foreign Language Requirements

Students must have had 2 years of a foreign language in high school or one year at the college level (6 credit hours) of the same language. College-level credits used to meet this requirement do not count towards the degree.

Satisfactory Progress Towards Degree

University Policy 91 outlines university-wide minimum criteria to determine if students are making satisfactory progress towards the completion of their degrees. The ECE Department fully supports this policy. Specific expectations for satisfactory progress for BSCPE and BSEE majors are as follows:

- Each student must meet the minimum University-wide criteria as described in Policy 91 and summarized in the Undergraduate Catalog (under Academic Policies)
- Upon completing 2 semesters in ECE, students must have satisfactorily completed ECE 2024 Circuits and Devices, ECE 2514 Computational Engineering, ECE 2544 Fundamentals of Digital Systems, MATH 2214 Introduction to Differential Equations, and PHYS 2306 Foundations of Physics
- Upon completing 3 semesters in ECE, students must have satisfactorily completed ECE 2804 Integrated Design Project.
- Upon attempting 90 credits, BSCPE and BSEE students must have successfully completed 33 credits of in-major courses and have 2.0 overall and in-major GPAs. (The BSCPE and BSEE in-major GPA includes all ECE courses, including repeats).

Grade Requirement

Students must earn a C or higher in the following ECE courses: ECE 1004 Introduction to ECE Concepts, ECE 2024 Circuits and Devices, ECE 2214 Physical Electronics, ECE 2514 Computational Engineering, ECE 2544 Fundamentals of Digital Systems, ECE 2564 Embedded Systems, ECE 2714 Signals and Systems, ECE 2804 Integrated Design Project.

Statement of Prerequisites

Pre-requisites for each course are listed. In general, all ECE courses require a C- or better in prerequisite courses. Students must earn a C or higher in the ECE courses listed above. There are no hidden prerequisites in this program of study. Prerequisites may change from what is indicated. Be sure to consult the Timetable of Classes or check with your advisor for the most current requirements.

Roadmap

Course	Title	Credits
First Year		
Fall Semester		
ECE 1004	Introduction to ECE Concepts (C)	3
ENGL 1105	First-Year Writing	3
MATH 1225	Calculus of a Single Variable (C-)	4
ENGE 1215	Foundations of Engineering (C-)	2
Select three credits from Pathways 2 or 3 or 6A		3
	Credits	**15**
Spring Semester		
ENGL 1106	First-Year Writing	3
MATH 1226	Calculus of a Single Variable	4
PHYS 2305	Foundations of Physics	4
ENGE 1216	Foundations of Engineering (C-)	2
MATH 2114	Introduction to Linear Algebra (C-)	3
	Credits	**16**
Second Year		
Fall Semester		
MATH 2214	Introduction to Differential Equations (C-)	3
PHYS 2306	Foundations of Physics	4
ECE 2024	Circuits and Devices (C)	3
ECE 2514	Computational Engineering (C)	3
ECE 2544	Fundamentals of Digital Systems (C)	3
	Credits	**16**
Spring Semester		
MATH 2204	Introduction to Multivariable Calculus	3
ECE 2214	Physical Electronics (C)	3
ECE 2564	Embedded Systems (C)	3
ECE 2714	Signals and Systems (C)	3
ECE 2804	Integrated Design Project (C)	2
Select three credits from Pathways 2 or 3 or 6A		3
	Credits	**17**
Third Year		
Fall Semester		
ECE 3504	Principles of Computer Architecture (C-)	3
ECE 3514	Data Structures & Algorithms (C-)	3
ECE 3544	Digital Design I (C-)	4
STAT 4714	Probability and Statistics for Electrical Engineers	3
Select three credits in Secondary Focus Area		3
	Credits	**16**
Spring Semester		
ECE 3004	AC Circuit Analysis	3
ECE 3074	AC Circuit Analysis Laboratory	1
ECE 3574	Applied Software Design	3
Select three credits in Secondary Focus Area		3
Select three credits in Secondary Focus Area		3
Free Elective		3
	Credits	**16**
Fourth Year		
Fall Semester		
ECE 4805	Senior Design Project (C-)	3
ECE 4540	VLSI Circuit Design	3
MATH 2534	Introduction to Discrete Mathematics	3
Select three credits in Pathways 2 or 3 or 6A		3
Select three credits in Pathways 2 or 3 or 6A		3
	Credits	**15**
Spring Semester		
ECE 4806	Senior Design Project	3
ECE 4514	Digital Design II	4
Select three credits in Pathways 7 or Free Elective (if Pathways 7 double counted)		3
Select three credits in Pathways 2 or 3 or 6A		3
Free Elective		4
	Credits	**17**
	Total Credits	**128**