

Digital Systems

Example outcomes gained by taking this track would include joining groups that design microprocessors, high-speed switches, and memories. Local employers would include Cadence, Cisco, Qimonda, Qualcomm, IBM, Maxim, nVidia, Mentor Graphics, and Synopsys. Employers outside of NC that recruit at NCSU include Intel, Cypress, Northrop Grumman, Raytheon, Broadcom, the US Department of Defense and others. Courses central to obtaining this outcome are the following:

- ECE 546 VLSI Design
- ECE 520 Digital ASIC Design
- ECE 745 ASIC Verification

Additional courses you should consider include the following:

Possible Core Courses

- ECE 521 Computer Design and Technology (Since Embedded CPUs are common, you should seriously consider this)
- CSC 505 Algorithms (ASIC architectures are based on algorithms – but this course can be hard to get into)
- ECE 544 Design of Electronic Packaging and Interconnects (Package and Board design)
- ECE 733 Digital Electronics (Follow on to full custom aspect of ECE 546, with an emphasis on IO design)

Possible Supplements to the Core:

- ECE 561 Embedded System Design (Since Embedded CPUs are common)
- ECE 506 Architecture of Parallel Computers (since embedded CPUs are often multicore)
- ECE 517 Object-Orientated Languages and Systems (programming skills are important + ECE 745 assumes knowledge in OO programming)
- ECE 761 Design Automation for VLSI (CAD basis for some of the tools used in core classes)

Application Area Courses

- ECE 747 DSP Architecture (Design application course)
- ECE 513 Digital Signal Processing (Application area – this is probably the most widely applicable course)
- ECE 515 Digital Communications (Application area, e.g. Broadcom)
- ECE 570 Computer Networks (Application area – Cisco and Juniper both recruit here)
- ECE 574 Computer and Network Security (Application area – often done in hardware)
- ECE 575 Introduction to Wireless Networking (Application area)
- ECE 582 Wireless Communication Systems (Application area)
- Advanced Application Area Courses Include ECE 514 (Random Processes), ECE 573 (Internet Protocols), ECE 576 (Connection- Orientated Networks),

ECE 743 (High Performance Multicomputer Architecture), ECE 751 (Detection and Estimation Theory), ECE 752 (Information Theory), ECE 762 (Advanced Digital Communication System), ECE 766 (Wireless Communications: Signal Processing Principles), ECE 774 Advanced Network Security, ECE 796 (Advanced Parallel Computer Architecture)

You should also find an opportunity to teach yourself a scripting language such as Python or Perl. Scripting is an important skill for Digital designers. We do not offer a graduate course in this area because it is fairly easy to learn on your own, and is not a “rigorous” subject.

We urge you to supplement the core courses with courses from the application areas of interest to you. This combination is what employers are often looking for.

It is also very useful to get a deeper custom circuit design experience by taking other circuits courses such as:

- ECE 511 Analog Electronics
- ECE 549 RF Design for Wireless
- ECE 712 Integrated Circuit Design for Wireless Communications

Sample M S Plan of Work

These plans of work are suggestions only. Feel free to seek other advice or to structure your own curricula. Please note that the actual courses taught are constantly changing, and these might be out of date. These are written assuming you are a full time student taking 10 courses over three semesters. You might choose to not overload in Spring, but take one last course in Spring after this.

Digital Systems					
Fall		Spring		Fall	
ECE546	D	ECE520	D	ECE 745	D
ECE513	DSP	ECE521	D	ECE582	COM
ECE521	D	ECE761	D	ECE513	DSP
ECE549	M/RF	ECE745	D	ECE570	N
ECE 570	N	ECE513	DSP	ECE 576	N
ECE 600		ECE574	N	ECE 582	COM
CSC 505		ECE 544	D/A/RF/M	ECE 762	COM
		ECE 575	N		
		ECE 515	COM		
		ECE 774	N		
D Digital, RF/M RF/Microwave, A Analog, DSP Digital Signal Processing, COM Communications, N Networking, M/RF Microwave/RF					

Courses with Dependencies	
Course	Dependency
ECE745	ECE520
ECE733	ECE546
ECE745	ECE520, ECE 513

Associated Faculty

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Last edited by P. Franzon 8/19/2009,