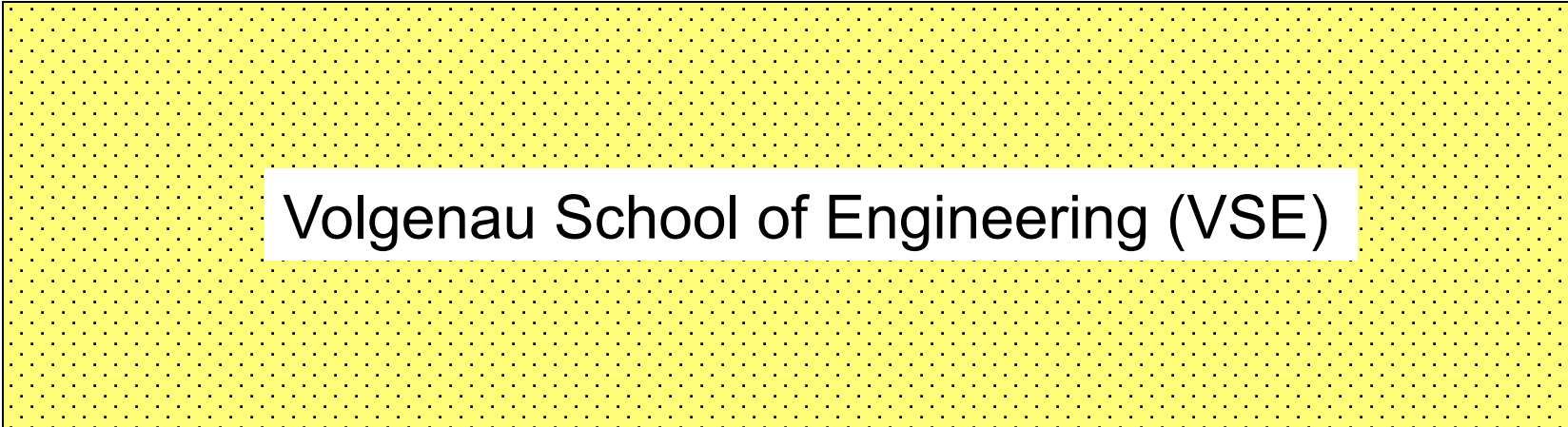


# **MS in Electrical Engineering & MS in Computer Engineering**

Choosing a Degree Program  
Specialization Area  
& Degree Option

Useful Hints

# George Mason University



College of Science

College of Humanities  
& Social Sciences

.....

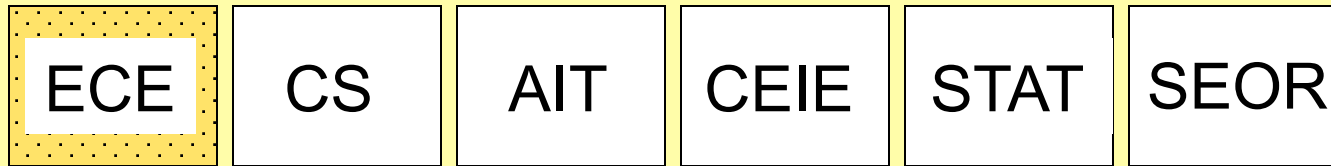
School of Management

College of Education  
& Human Development

.....

# Volgenau School of Engineering

## Six Departments:



ECE – Electrical and Computer Engineering

CS – Computer Science

AIT – Applied Information Technology

CEIE – Civil, Environmental and Infrastructure Engineering

STAT – Statistics

SEOR – Systems Engineering and Operations Research

# Academic Programs run by the ECE Department

## Undergraduate Degrees

BS in Electrical Engineering  
BS in Computer Engineering

## Master Degrees

**MS in Electrical Engineering**  
**MS in Computer Engineering**  
MS in Telecommunications  
MS in Computer Forensics

## PhD Degrees

PhD in Electrical and Computer Engineering

# ECE Department

## Programs

**MS in Electrical Engineering**  
**MS EE**

**MS in Computer Engineering**  
**MS CpE**

**BIOENGINEERING**

**COMMUNICATIONS  
& NETWORKING**

**SIGNAL PROCESSING**

**CONTROL & ROBOTICS**

**MICROELECTRONICS/  
NANOELECTRONICS**

**SYSTEM DESIGN**

**DIGITAL SYSTEMS DESIGN**

**MICROPROCESSORS  
& EMBEDDED SYSTEMS**

**COMPUTER NETWORKS**

**NETWORK & SYSTEM  
SECURITY**

**Specializations**

# Three Degree Options

**8 courses + 2 semesters of ECE 799 Master's Thesis**

*OR*

**9 courses**

**+ 1 semester of ECE 798 Research Project**

**+ Scholarly Paper (typically equivalent to ECE 798 report)**

*OR*

**10 courses + Scholarly Paper**

# MS EE

2 out of 6  
core  
courses

Up to  
8 elective  
courses

MINIMUM  
THREE 600+  
courses from  
a chosen  
specialization area

MAXIMUM  
TWO  
non-ECE courses  
(including TCOM)

Selected from  
over 40  
ECE, CS, ISA, SWE  
& TCOM courses

4 pre-approved  
electives  
separate for each  
specialization  
area

UP TO 50% OF  
non-ECE courses

# MS CpE

2 out of 5  
core  
courses

Up to  
8 elective  
courses

MINIMUM  
THREE 600+  
courses from  
a chosen  
specialization area

MAXIMUM  
TWO  
non-ECE courses  
(including TCOM)

Selected from  
over 40  
ECE, CS, ISA, SWE  
& TCOM courses

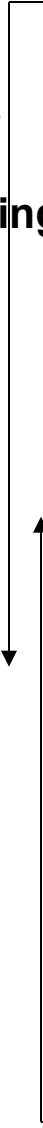
4 pre-approved  
electives  
separate for each  
specialization  
area

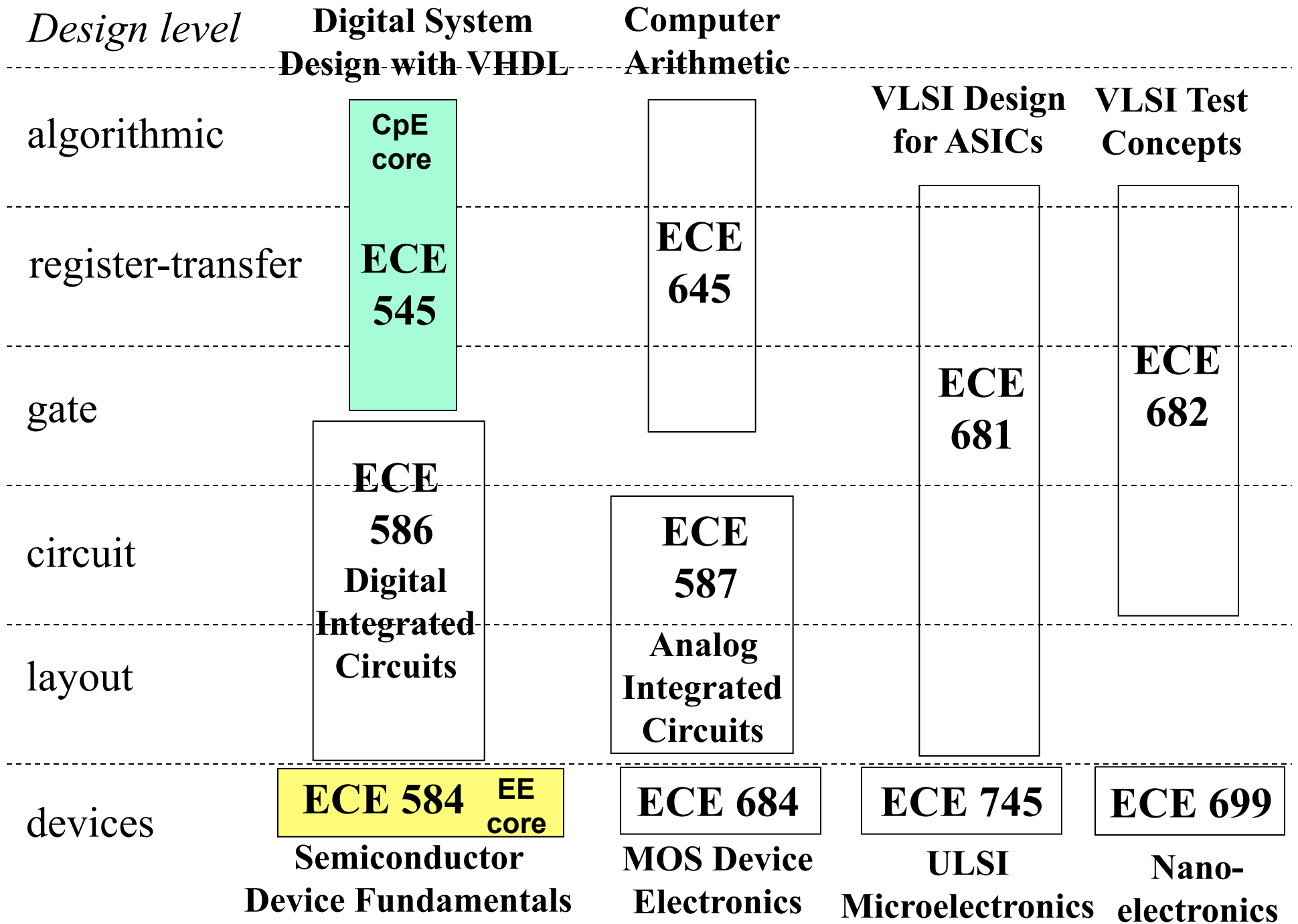
UP TO 50% OF  
non-ECE courses

# Choosing a Degree Program and Specialization Area

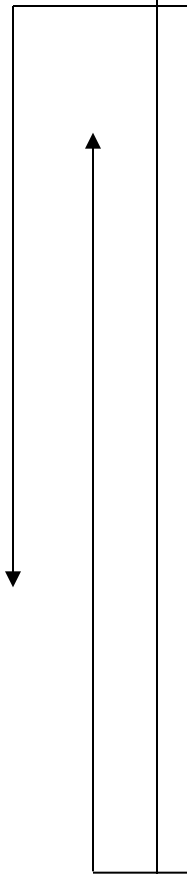
MS CpE vs. MS EE

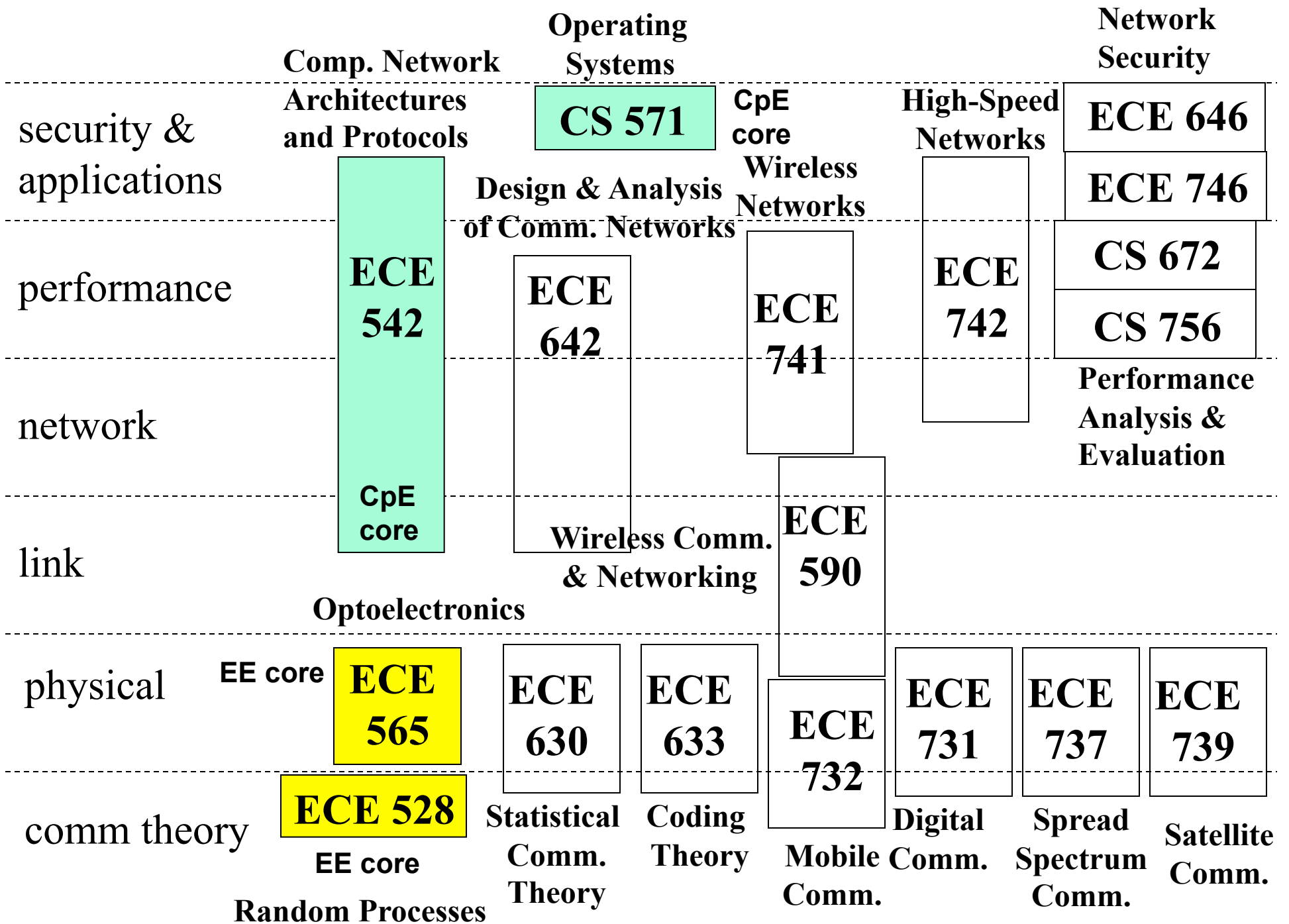
I am interested in...	I want to specialize primarily in...	Recommended program & specialization
VLSI	<b>CAD tools &amp; Design Automation</b>	MS CpE Digital Systems Design
Digital Systems Design	<b>Hardware Description Languages</b>	
ASICs & FPGAs	<b>FPGAs &amp; Reconfigurable computing</b>	
VHDL/Verilog	<b>Computer Arithmetic</b>	
CAD Tools	<b>Front-end ASIC Design (algorithmic down to gate level)</b>	
Reconfigurable Computing	<b>Back-end ASIC Design (circuit and mask layout levels)</b>	
Microelectronics	<b>Analog &amp; Digital Circuit Design</b>	
VLSI Fabrication	<b>VLSI Fabrication</b>	
Nanoelectronics	<b>Microelectronics</b>	
	<b>Nanoelectronics</b>	
	<b>Semiconductor Devices</b>	MS EE Microelectronics/ Nanoelectronics





I am interested in...	I want to specialize primarily in...	Recommended program & specialization
Communications, Computer Networks, Networking, Telecommunications, etc.	Application layer Network Security Performance analysis & evaluation Network layer Link layer Physical layer Communication theory	MS CpE Computer Networks       MS EE Communications & Networking





I am interested in...	I want to specialize primarily in...	Recommended program & specialization
Computer Architecture	Computer architecture	MS CpE Microprocessors & Embedded Systems
Microprocessors	Microprocessors	
Microcontrollers	Microcontrollers	
Embedded Systems	Embedded systems	
Real Time Systems	Real-time systems	
Robotics	Robotics	
Control	Control systems	
	Optimal control theory	

I am interested in ....

Recommended  
program &  
specialization

Digital Signal Processing

Digital Image Processing

Analysis and implementation of DSP algorithms

MS EE  
Signal Processing

Systems architecture design

System integration and architecture evaluation

MS EE  
Architecture Based  
System Integration

I am interested in ....

Recommended  
program &  
specialization

Computer Network Security

Cryptography

Trade-offs between security, efficiency & cost

Performance and implementation  
aspects of security systems

Implementations of cryptography  
in software and/or hardware

Attacks against implementations

MS CpE

Network and System  
Security

# MS CpE Specialization Areas

## Summary

	<p style="text-align: center;"><b>CpE</b></p> <p style="text-align: center;"><b>Digital Systems Design</b></p>	<p style="text-align: center;"><b>CpE</b></p> <p style="text-align: center;"><b>Microprocessors and Embedded Systems</b></p>
<p><b>Pre-Approved Electives</b></p>	<p>ECE 545 Digital System Design with VHDL            ECE 645 Computer Arithmetic            ECE 681 VLSI Design for ASICs            ECE 586 Digital Integrated Circuits</p>	<p>ECE 511 Microprocessors            ECE 545 Digital System Design with VHDL            ECE 611 Advanced Microprocessors            ECE 612 Real-Time Embedded Systems</p>
<p><b>Suggested Electives</b></p>	<p>ECE 584, 684, ... (technology)            ECE 511, 611, ... (microprocessors)            ECE 646, 746, ... (applications)</p>	<p>CS 540, 583 (languages, algorithms)            CS 635 (parallel machines)            ECE 542, 642, 742 (networks)            ECE 645, 681 (digital design)            ECE 548 (sequential mach. theory)</p>
<p><b>Professors</b></p>	<p><b>K. Gaj, J. Kaps, K. Hintz, T. Storey</b></p>	<p><b>J. Kaps, P. Pachowicz, K. Hintz, C. Sabzevari</b></p>

	<p style="text-align: center;"><b>CpE</b></p> <p style="text-align: center;"><b>Computer Networks</b></p>	<p style="text-align: center;"><b>CpE</b></p> <p style="text-align: center;"><b>Network and System Security</b></p>
<p><b>Pre-Approved Electives</b></p>	<p>ECE 528 Random Processes in ECE ECE 542 Computer Network Architectures and Protocols ECE 642 Design and Analysis of Computer Networks ECE 742 High-Speed Networks or ECE 741 Wireless Networks</p>	<p>ECE 542 Computer Network Architectures and Protocols ECE 646 Cryptography and Computer Network Security ECE 746 Advanced Applied Cryptography ISA 656 Network Security</p>
<p><b>Suggested Electives</b></p>	<p>CS 672, CS 756 (performance) ECE 646, 746 (security) ECE 511, 611 (microprocessors) ECE 590, 630, 633, 731, 732, 733, 737, 739 (communications)</p>	<p>ISA 562, 564, 674, 765, 767 (network security) ECE 642, 741, 742 (computer networks) ECE 545, 645 (hardware implementations) ECE 511, 611 (microprocessors)</p>
<p><b>Professors</b></p>	<p>B.L. Mark, S.C. Chang, B. Jabbari</p>	<p>K. Gaj, J. Kaps</p>

# CpE Graduate Coordinator

**Kris Gaj**

## **Responsibilities:**

- **admission decisions**
- **initial interviews with the potential candidates**  
**helping them to choose the right specialization area**
- **keeping a record of students pursuing particular**  
**specialization areas and graduating within**  
**a given specialization area**
- **approving transfers between two specialization areas**
- **dealing with any exceptional circumstances.**

# Transfers and Degree Requirements

# Transfer between Programs

- possible only after one semester of studies at GMU
- requires permission from the directors of the proposed and the current programs
- especially easy within the ECE Department, i.e., between the MS EE and MS CpE programs
- application form available at <http://ite.gmu.edu/forms/2003/changeofdegreestatusform.pdf>

# **Transfer of Credit**

**In order to be applied to a given specialization area, all course credits transferred from**

- other universities**
- non-degree status**

**must be approved by the student's advisor prior to being presented for the final approval to the Department Chair.**

Limitations:

- up to 12 credit hours, including courses taken at GMU in non-degree status
- all courses taken within 6 years of first enrollment at GMU
- grade of B or better

# Plan of Study

A tentative plan of study must be submitted by each student to the student's advisor and the main ECE office no later than before the end of the second semester in the degree program at GMU.

# Degree Requirements

- total degree GPA of 3.0 (B) or better  
(degree GPA takes into account only courses applied towards graduation)
- no more than two C grades applied towards graduation
- graduate students who receive grades of F in two courses, or nine credit hours of unsatisfactory grades (C or worse) are very likely to be dismissed from the university. Exceptions are extremely rare.

# Seminar Requirements

- minimum of 10 approved departmental seminars
- recorded on the attendance sheet and in the personal record

# Choosing an Option within a Degree

MS EE & MS CpE

# MS EE & MS CpE

**MS Thesis  
Option**

**8  
courses**

**ECE 799  
Master's Thesis  
(6 cr. hrs)**

**Research Project  
Option**

**9  
courses**

**ECE 798  
Research Project  
Scholarly paper**

**Scholarly Paper  
Option**

**10  
courses**

**Scholarly paper**

# Master's Thesis (1)

Recommended for students interested in research and considering pursuing Ph.D. studies in the future

Topic typically proposed by a faculty member. Topics suggested by a student and/or related to the student's job allowed

RA positions available for selected topics

Student works closely with his/her academic advisor, for at least two semesters

Conference/journal publication expected as a result of the student's research

## Master's Thesis (2)

Student must register (and pay for) at least 6 credit hours of ECE 799 Master's Thesis

After registering for ECE 799 once, the students must register for at least one credit hour of ECE 799 every Spring and Fall semester until they graduate

Oral defense open to general public in front of a three-faculty-member thesis committee

Temporary grades for all but last ECE 799 are IP = In Progress. These grades are changed after the successful defense to S – Satisfactory

Taking ECE 799 does not affect your GPA

# Scholarly Paper (1)

Mandatory for all students who choose not to write an MS research thesis.

Survey of new technologies, new methodologies, or new applications. Comparative analysis or case study.

Topic typically proposed by a faculty member. Topics suggested by a student and/or related to the student's job allowed.

Student works with minimum supervision of the professor.

The role of the professor is to verify that the scholarly paper meets the requirements for graduation.

The professor is under no obligation to approve the paper.

## Scholarly Paper (2)

The paper must follow accepted standards for

- English
- technical writing
- citation of references
- GMU Honor Code.

The paper should be delivered to the advisor at least five weeks before the end of the classes in the given semester.

A seminar should be presented in front of the advisor and one additional faculty member.

The seminar should be announced at least two weeks before the presentation date.

If the reference is from a web source, the date of extracting the information must also be given as well as the URL

## Rules regarding all written work

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- **Honor Code**

[www.turnitin.com](http://www.turnitin.com)

- Do not copy other student's work
- Do not copy from the web without using quotation marks around copied work
- Usually no more than 40% of content may be directly quoted
- All quotations must have a reference cited
- ECE students are sent to the honor court each year

# Rules regarding all written

---

- **Honor Code**

- Do not copy other student work
- Do not copy from the internet without using quotation marks
- Usually no more than 10% of content may be directly copied
- All work must have a reference cited
- TCOM students are sent to the honor court each year

**Possible end of Academic Career at GMU**

# Funding Your Education

# Options available for international students

- Teaching Assistantships (TA)
- Research Assistantships (RA)
- Work on Campus

# ECE Teaching Assistantships

10 or 20 hours per week

Salary + out-of-state to in-state tuition release

Grading, recitations, and labs for selected  
ECE and IT undergraduate and a few ECE graduate courses

About 16 20-hr-per-week positions available each semester.  
Applications need to be submitted to the  
ECE main office before the end of the preceding semester

Preference given to senior students maintaining good GPA,  
with no C's or F's

Practical skills, such as documented knowledge of  
Matlab, PSpice, VHDL, Aldec Active HDL, Xilinx ISE, FPGA boards,  
microcontrollers, measurement equipment, etc. very welcome

# IT&E Teaching Assistantships

20 hours per week

Salary + out-of-state to in-state tuition release

Limited number of positions available in the IT&E Labs

- system administrators (requires documented experience in administration of systems running Windows XP, Unix, or Linux)
- lab monitors.

Decisions made by the Director of Computing Resources, Mr. Jonathan Goldman.

Applications need to be submitted to Mr. Goldman before the end of the preceding semester.

Limited number of TA positions available in other Departments; rarely granted to ECE students.

# Research Assistantships

10 or 20 hours per week, salary + tuition

Research in the area of interest of a given ECE faculty member

Work on a research grant of a given professor

Candidates selected individually by each professor

Preference given to students maintaining good GPA, with no C's or F's, with excellent grades in courses taught by the given faculty member

Documented practical skills and experience in the area of research of the given faculty member very welcome

MS Thesis option, earlier publications, and PhD plans a plus

Very rarely granted to students in the first semester of their studies

# Work on Campus

Up to 20 hours per week, salary, no tuition

Requirement to take 9 credit hours per semester to maintain the full-time status

Available positions

- department offices
- GMU library
- post-office
- computer labs
- bookstore
- cafeteria, etc.

# Tips-n-Hints for Success

Graduate courses require much more outside work/study than undergraduate courses.

You may want to limit your enrollment to just one course if you work full time, and two courses if you work part time.

Higher level courses require a larger amount of work than lower level courses and build on material from the lower level courses.

Courses with projects are particularly time consuming. Try to take no more than one such course per semester if possible.

Your degree is not a race. Get understanding, not just a credit. Give yourself enough time for each subject.

# Tips-n-Hints for Success – cont.

Plan your courses ahead. Talk with your advisor.

Make your plan of study coherent.

Avoid a mere hodge-podge of various courses.

Study groups are particularly helpful,  
but be aware of the GMU honor code rules.

Start early; if you fail the first midterm or the first project,  
it might be already impossible to catch up.

Talk with instructor and your advisor if you start to think  
you might be having problems (academic or personal).

Listen to friends, believe faculty.

**Thank you!**



Questions???