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2007-2008 ACADEMIC YEAR

University of Virginia

Charles L. Brown Department of Electrical and Computer Engineering Undergraduate Handbook

Foreword

The purpose of this handbook is to introduce you to the Department of Electrical and Computer Engineering and to assist you in planning your course of studies. For the rules and regulations of the University and the School of Engineering and Applied Science, including graduation and other academic requirements, you should consult the University of Virginia Undergraduate Record. Appendix V summarizes a brief statement of a few of the most relevant regulations. Information regarding undergraduate advising can be found on the SEAS homepage at http://www.seas.virginia.edu/advising/undergradhandbook.php. Information on the Electrical and Computer Engineering homepage can be found at http://www.ECE.virginia.edu. The School of Engineering and Applied Science homepage can be found at http://www.seas.virginia.edu.

Mission Statement

The mission of the Department of Electrical and Computer Engineering is to educate students to become leaders in the fields of electrical and computer engineering and the community as a whole, and to perform advanced scholarly research that creates new knowledge, innovative technology, and employment opportunities, to enhance the economic competitiveness of the Commonwealth of Virginia and to improve the quality of life for all humanity.

Electrical Engineering Program Educational Objectives and Outcomes

Electrical Engineering Educational Objectives

Graduates of the Electrical Engineering program at the University of Virginia will have the knowledge, skills and attitudes that will allow them to make tangible contributions, meet new technical challenges, contribute effectively as team members, and be innovators in the analysis, design and implementation of electrical and electronic devices and systems. They will communicate effectively and interact responsibly with colleagues, clients, employers and society.

Electrical Engineering Program Outcomes

The **fundamental principles** and techniques of mathematics and science enables our graduates to contribute to an engineering effort. The graduated student will have:

Outcome 1.a. a knowledge of mathematics (including differential equations), science, and engineering fundamentals.

Outcome 1.b. an ability to identify, formulate, and solve engineering problems.

Outcome 1.c. an ability to design and conduct experiments; analyze and interpret data.

Outcome 1.d. an ability to effectively communicate technical material.

Outcome 1.e. an ability to function as a member of a multidisciplinary team.

An **in-depth knowledge of electrical engineering** enables our graduates to contribute in their area of expertise. The graduated electrical engineering student will have:

Outcome 2.a. a knowledge of the electrical engineering fundamental topics in circuits, fields, and digital logic.

Outcome 2.b. a knowledge of advanced topics in mathematics including vector calculus, transform calculus, complex variables and probability and statistics.

Outcome 2.c. to design systems containing both hardware and software elements.

Outcome 2.d. the ability to specify, design, analyze and test an electrical/electronic system to meet a set of desired goals, within the context of a broader system application.

Outcome 2.e. an understanding and awareness of technological advances in electronic devices, materials, computational and communications techniques.

Outcome 2.f. specialized knowledge in one or more of the topical areas of electrical engineering: controls, communications, electrophysics, digital systems, or microelectronics.

Outcome 2.g. Preparation for graduate-level & advanced studies in electrical engineering.

An understanding of the Jeffersonian Principles of free enquiry, ethical awareness, creativity, and **professionalism** enables successful careers and responsible engineering practice. The graduated student will:

Outcome 3.a. recognize the need for and be capable of engaging in lifelong learning.

Outcome 3.b. receive a broad education in the humanities and social sciences, to gain an understanding of contemporary issues.

Outcome 3.c. understand the interrelationships between technology and contemporary society.

Outcome 3.d. understand the ethical and professional responsibilities of an engineering practitioner or researcher.

A Welcome from the Chair

Welcome to the Department of Electrical and Computer Engineering. Your admission to the School of Engineering and Applied Science places you among the very best students in our nation. In addition, we feel strongly, on the basis of your background and accomplishments, that you have what it takes to earn a degree here at Virginia. Your acceptance into the Department of Electrical and Computer Engineering places you in an even more select group. We offer you a challenging course of studies, a situation worthy of your talents. Your success in this endeavor will require much work and determination, and is in your hands. However, we are here to help you in any way we can.

The Department of Electrical and Computer Engineering is very strong in every one of the areas of frequent concern in engineering education:

1. ***Excellent student-to-faculty ratio***. At Virginia you will find a ratio of approximately 16:1, allowing faculty members to devote much individual attention to students.

2. ***Highly qualified faculty***. At Virginia you will be treated to the opportunity of taking courses from highly qualified faculty, many of whom are internationally known for their achievements.

3. ***State-of-the-art laboratory equipment.*** Recent state allocations have continued to allow us to equip our laboratories with some of the finest in electronic equipment.

4. ***Integration of computers and state-of-the-art software into the curriculum.*** You will find that computers and electronic design automation are used extensively in your courses. Also of great importance, we provide a high degree of access to these facilities throughout the Engineering School.

You will find that a bachelor's degree in electrical engineering provides you with a variety of excellent career options. Not only is the job market for electrical and computer engineers in government and industry very favorable, but abundant opportunities exist for continuing your education at the graduate level. Moreover, the rigorous nature of the electrical engineering curricula provides an excellent preparation for advanced study and entry into a professional career in such fields as business, law, and medicine.

For the above reasons we feel strongly that you have made a wise choice in selecting the profession of Electrical and Computer Engineering, and the University of Virginia.

I hope you will take full advantage of the educational opportunities available in the Department. Good luck in your endeavors over the next several years and I hope that you enjoy your undergraduate years at UVa.

Lloyd R. Harriott,
Virginia Microelectronics Consortium Professor and Chair

The Electrical and Computer Engineering Professions

Most dictionaries define engineering as that profession which applies mathematics and science to provide economical utilization of the materials and forces of nature in structures, machines, systems and products for the benefit of humanity. Thus, an engineer is quite different from a scientist, who is concerned principally with uncovering general truths and the operation of general laws having to do with nature. While the domains of study are quite close, the two disciplines have very different goals.

Electrical and computer engineering requires of its practitioners an unusually thorough knowledge of advanced mathematics and basic sciences. This is necessary because of the extremely broad spectrum of areas comprising the discipline. For example, electrical and computer engineers are concerned with the following:

- communication systems ranging from local to satellite networks
- computer graphics for engineering workstation and displays
- computer networking
- computer vision and robotics
- control systems for aircraft, automobiles, satellites, and a multitude of other products
- design automation
- design and construction of computers and peripherals
- digital picture processing of images from a variety of sources for the purpose of improving the ability to extract information
- electric power systems electronic systems and products, such as television and stereophonic equipment
- electro-optical systems, including computers and signal processing devices
- instrumentation
- integrated circuits and systems on chips
- microwave circuits and systems
- semiconductor devices and materials
- signal processing methodologies and systems .

The curriculum devised by the faculty of the Department will develop your abilities to practice the professions of electrical and computer engineering in an effective manner. As discussed elsewhere in this Handbook, you and your advisor can tailor a program of study that will emphasize particular areas of interest to you.

Student Advising

As an electrical or computer engineering student, you have been assigned a faculty advisor to assist you in several important aspects of preparing for your profession. Your faculty advisor will assist you in preparing and updating your program of study. This handbook provides several suggested programs of study which will enable you to complete your degree in four years. You must consult your advisor and obtain his/her signature whenever you register or preregister for classes. Your advisor will also provide counsel on matters such as appropriate student organizations which can further your understanding and enhance your participation in the profession of electrical and computer engineering and develop your understanding of the social, ethical and economic considerations implicit in the practice of engineering. Be sure to visit your advisor at least once, and preferably twice a semester to keep him/her abreast of your progress and any problems you may encounter. If you wish to change advisors, first obtain the consent of the person you wish to advise you, and then notify Mr. Dan Fetko in the Department office, C-210 Thornton Hall. Any problems or questions which you cannot resolve successfully with your advisor should be brought to the attention of Dr. Wilson, the Associate Chair, in room C-319, Thornton Hall.

If you or your advisor wish to consult your student file, see Mr. Dan Fetko. Mr. Fetko also maintains a bulletin board around the corner from the Department entrance, on which he posts schedules, advisor lists and other information of student interest. Information on summer jobs, scholarships, etc. is posted on bulletin boards in the C3 lobby beside the elevator.

To facilitate convenient communication with your advisor, the Department uses the University's electronic mail system. This allows either you or your advisor to request an appointment when necessary or, in many cases, to resolve questions without the need for a meeting. It is important that you check your computer account for mail on a regular basis. Appendix IV contains instructions on how to register for the mail system. E-mail is an easy way for you to communicate with faculty and staff, as well as other students, here and at other Universities. **Email is <u>not</u> intended as a substitute for personal visits with your adviser and instructors.**

Computer Engineering Program (CPE)

A separate degree program in Computer Engineering is offered by the Departments of Electrical and Computer Engineering and Computer Science at UVA. See the web page (www.cpe.virginia.edu) for more information, or contact Prof. Joanne Dugan at 434-982-2078 or 434-924-3198.

Minimal Requirements for the Major Design Experience (MDE)

Currently the major MDE course is ECE 407-01. Students can enroll in other sections of the MDE course (ECE 407-02, ECE 407-02 etc, who must be taught by the ECE faculty) if the section meets the following criteria:

1. The course must be focused on a semester-long major design project that addresses a real-world engineering problem.
2. Each student must be a member of a team of at least 3 members.
3. A written project proposal should address a) the problem statement, b) the requirements and c) formal specifications.
4. At least one oral presentation should be given by each student during the semester.
5. The project will have a final written report. The report should address considerations and constraints in most of the following types: economic, environmental, sustainability, manufacturability, ethical, health & safety, social and political (as mandated by ABET).
6. The final report (or earlier report) should also provide a detailed design and discussion of tradeoffs, as well as design validation and verification.

Examples of other sections of the MDE course are projects such as the solar house and the Bluetooth competition. ECE 436 will be accepted as the MDE course for EE majors.

1. What courses can be used as HSS electives?

The dean's office publishes a list of courses that can and cannot be used to meet this requirement. This list can be found in this handbook.

2. Is there anything else that we need to be aware of in choosing an HSS elective?

Students cannot take language courses in their native language for HSS electives. Native language was designated on their application to UVa.

3. Are unrestricted electives completely unrestricted?

Not really. By definition, an unrestricted elective may be any graded course in the University except mathematics courses below MATH 131 (or APMA 109) and any other courses that substantially duplicate courses offered for the degree.

4. I have to take APMA 109. Can I use it for something?

Yes. You can use it as an unrestricted elective (three credits).

5. What are the choices for the science elective?

There are 6 choices: BIOL201, BIOL202, CHEM152, ECE200, MSE209 and PHYS252,

6. What courses are counted as Tech Electives?

A technical elective is defined as a course in engineering, mathematics, or science (intended for science majors) at the 200 level or above. Of the four technical electives, two must be at the 300 level or above. Any course appearing on the approved list of HSS electives may not be used as a technical elective.

7. Can I take COMM classes as Tech electives?

COMM classes may be used as unrestricted electives, not as technical electives.

8. Can I take ASTR 342 as a Technical Elective?

No. ASTR 342 is not intended for science majors.

9. Are we required to sign up for the ECE407 MDE course?

Yes. But, you have the option to sign up either ECE407-01 (the main section) or ECE407-02, ECE407-03 etc, as long as they satisfy the MDE criteria approved by the faculty. The MDE criteria can be found in this handbook. (See also question # 13.)

10. What requirements can ECE 200 be used to fulfill?

ECE200 can be used as a science elective, a tech elective or an unrestricted elective. It is not an ECE elective.

11. I heard that some physics and MSE courses can be used to satisfy ECE electives requirement. Is that true?

    Yes. The Undergraduate Curriculum Committee recommend to develop ECE classes that are cross listed with MSE 567 (Optical and Magnetic Properties of Material), PHYS 531 (Optics) and PHYS 532 (Fundamentals of Photonics). Before such ECE courses are developed, EE students may use these MSE and Physics courses as ECE electives.

12. Can I deviate from the curriculum a little bit?

    Deviation from the curriculum requires the approval of the Undergraduate Curriculum Committee. You must petition to the Undergraduate Curriculum Committee for any deviation. Petition should be discussed with your adviser, and should be sent by email to Professor Lin (**zl5y@virginia.edu**).

13. Can I use ENGR 401 and ENGR 402 as ECE electives?

    If you want to use ENGR 401/402 to fulfill the MDE requirement, you may petition to use ENGR 401 as an ECE elective. The Undergraduate Curriculum Committee will approve the petition based on the actual Electrical Engineering contents of your project. ENGR 402 cannot be used as an ECE elective.

(BY SEMESTER)

NAME_____

FIRST SEMESTER		CREDIT HRS.	GRADE	COMMENTS OR NOTES
APMA 111	Single Variable Calculus	4		
CHEM 151	Introductory Chemistry for Engrs.	3		
CHEM 151L	Introductory Chemistry for Engrs. Lab	1		
ENGR 162	Introduction to Engineering	4		
STS 101	Language Comm. & Tech. Soc.	3		

15 Credits

SECOND SEMESTER		CREDIT HRS.	GRADE	COMMENTS OR NOTES
APMA 212	Multivariable Calculus	4		
CS 101	Intro. Computer Science	3		
PHYS 142E	General Physics I	4		
SCI 1	Science Elective (1)	3		
HSS 1	HSS Elective (2)	3		

17 Credits

THIRD SEMESTER		CREDIT HRS.	GRADE	COMMENTS OR NOTES
APMA 213	Ordinary Differential Equations	4		
CS 201	Software Dev. Meth.	3		
ECE 203	Introductory Circuit Analysis	3		
PHYS 241E	General Physics II	3		
PHYS 241L	Physics Lab I	1		
HSS 2	HSS Elective (2)	3		

17 Credits

FOURTH SEMESTER		CREDIT HRS.	GRADE	COMMENTS OR NOTES
MATH	Math Elective (200 LEVEL/ABOVE)	3		
ECE 204	Electronics I	4		
ECE 230	Digital Logic Design (3)	3		
TECH 1	Technical Elective (4)	3		
STS 2--	STS Elective	3		

16 Credits

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FIFTH SEMESTER		CREDIT HRS.	GRADE	COMMENTS OR NOTES

ECE 309	Electromagnetic Fields	3		
ECE 323	Signals & Systems I	3		
ECE 1	ECE Elective 1 (5)	3		
TECH 2	Technical Elective (4)	3		
UE 1	Unrestricted Elective (6)	3		

15 Credits

SIXTH SEMESTER		CREDIT HRS.	GRADE	COMMENTS OR NOTES
APMA 310	Probability	3		
ECE 333	Computer Architecture (7)	3		
ECE 2	ECE Elective 2 (5)	3		
TECH 3	Technical Elective (4)	3		
HSS 3	HSS Elective (2)	3		

15 Credits

SEVENTH SEMESTER		CREDIT HRS.	GRADE	COMMENTS OR NOTES
STS 401	Western Tech. and Culture	3		
ECE 3	ECE Elect. 3 (5) (Major Design Experience)	3		
ECE Lab 1	ECE Lab Elective 1 (5)	1.5		
ECE 4	ECE Elective 4 (5)	3		
ECE 5	ECE Elective 5 (5)	3		
UE 2	Unrestricted Elective (6)	3		

16.5 Credits

EIGHTH SEMESTER		CREDIT HRS.	GRADE	COMMENTS OR NOTES
STS 402	The Engr., Ethics and Society	3		
ECE 6	ECE Elective 6 (5)	3		
ECE Lab 2	ECE Lab Elective 2 (5)	1.5		
ECE 7	ECE Elective 7 (5)	3		
TECH 4	Technical Elective (4)	3		
UE 3	Unrestricted Elective (6)	3		

16.5 Credits

TOTAL = 128 CREDITS

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1. **Science Elective I** must be chosen from the following list. The associated lab is not required but is encouraged.

BIOL 201 - Introduction to Biology
BIOL 202 - Introduction to Biology
CHEM 152 - Introductory Chemistry for Engineers
PHYS 252 - Introductory Physics I,II, III, IV
MSE 209 - Introduction to the Science and Engineering of Materials
ECE 200 - Science of Information

2. **HSS Electives** are to be selected from the list of approved courses which has been prepared by the school, and is included in the *Electrical Engineering Undergraduate handbook,* available at the department office.

3. ECE 230 is offered both in the Fall and Spring semesters. One could take it in the 3rd semester.

4. **A Technical Elective** is defined as a course in engineering (may be ECE), mathematics, or science (intended for science majors) at the 200 level or above. Of the four technical electives, two must be at the 300 level or above. Any course appearing on the approved list of HSS electives may not be used as a technical elective.

5.

- ECE 435, ECE 436 each count as one course and one lab if chosen as electives. At least two courses and one lab must fall within a single area of concentration. The five areas of concentration available are:
  a. Applied ElectroPhysics
  b. Communications and Signal Processing
  c. Digital Systems
  d. Controls
  e. Microelectronics
- One of the seven ECE electives must be the Major Design Experience (MDE) course, currently offered as ECE 407 - Electrical Engineering Projects.
- MSE 567 - (Optical and Magnetic Properties of Material), PHYS 531-(Optics) and PHYS-532 (Fundamentals of Photonics) will be cross-listed as ECE courses. Before such cross-listing takes place, EE students may use these courses as ECE electives.
- If you use ENGR 401/ENGR 402 to fulfill your MDE requirement, and your project involves sufficient Electrical Engineering content, you may petition to use ENGR 401 as an ECE elective.

6. An **Unrestricted Elective** may be any graded course at the University *except* level-1 mathematics and any other courses that substantially duplicate courses offered for the degree.

7. ECE 333 is offered both in the Fall and Spring semesters. One could take it in the 5th semester.

A list of electives which fulfill the requirements of each concentration is included in the *Electrical Engineering Undergraduate Handbook.*

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(By Requirements)

Humanities and Social Science (HSS)	Semester	Credit Hours	Grade
HSS1			
HSS2			
HSS3			

Unrestricted Elective	Semester	Credit Hours	Grade
UE1			
UE2			
UE3			

Required Science and Science Electives	Semester	Credit Hours	Grade
CHEM 151 – Intro. Chem. For Engrs.		3.0	
CHEM 151L – Intro. Chem. For Engrs. Lab		1.0	
PHYS 142E – General Physics I		4.0	
PHYS 241E – General Physics I		3.0	
PHYS 241L – Physics Lab 1		1.0	
Science Elective		3.0	

Applied Mathematics and Mathematics Elective	Semester	Credit Hours	Grade
APMA lll – Single Variable Calculus		4.0	
APMA 212 – Multivariable Calculus		4.0	
APMA 213 – Ordinary Diff. Equations		4.0	
APMA 310 – Probability		3.0	
Mathematics Elective		3.0	

ENGR	Semester	Credit Hours	Grade
ENGR 162 – Introduction to Engineering		4.0	

Computer and Software	Semester	Credit Hours	Grade
CS 101 – Intro. To Comp. Sci.		3.0	
CS 201 – Software Dev. Methods		3.0	

Technical Electives	Semester	Credit Hours	Grade
Tech. Elect 1		3.0	
Tech. Elect. 2		3.0	
Tech. Elect. 3		3.0	
Tech. Elect. 4		3.0	
ECE Electives	Semester	Credit Hours	Grade

ECE 1		3.0	
ECE 2		3.0	
ECE 3 (Major Design Experience)		3.0	
ECE 4		3.0	
ECE 5		3.0	
ECE 6 (Concentration)		3.0	
ECE 7 (Concentration)		3.0	
ECE Lab 1		1.5	
ECE Lab 2		1.5	

ECE Requirements	Semester	Credit Hours	Grade
ECE 203 – Intro. Circuit Analysis		3.0	
ECE 204 – Electronics I		4.0	
ECE 230 – Digital Logic Design		3.0	
ECE 309 – Electromagnetic Fields		3.0	
ECE 323 – Signals & Systems I		3.0	
ECE 333 – Computer Architecture		3.0	

STS and Thesis	Semester	Credit Hours	Grade
STS 101 - Lang. Comm. & Tech. Soc.		3.0	
STS 401 – Western Tech. & Culture		3.0	
STS 402 – The Engr., Ethics & Soc.		3.0	
STS 2xx – STS Elective		3.0	
Thesis: Coordinated under STS 401 and STS 402			

Total = 128 Credits

Major Design Experience	Semester	Credit Hours	Grade
		3.0 Credits of ECE Elective	

Concentration Area:	Semester	Credit Hours	Grade
ECE		3.0	
ECE		3.0	
ECE Lab		1.5	

January 2006

Concentration Areas

Elective Courses and Concentration Areas

Students must choose electives so that at least two courses and lab fall within a single area of concentration. The concentration areas and courses are listed below. Courses labeled with an **(F)** are normally offered in the Fall semester, while those with an **(S)** are normally offered in the spring, and courses labeled with an **(O)** are occasionally offered when there is sufficient student interest. Students with a 3.2 or better GPA may choose 600-level graduate courses as electives.

Controls	**Credits**
(F) ECE 402 Linear Controls	3.0
(F) ECE 403 Control Lab.	1.5
(S) ECE 412 Digital Control	3.0
(F) ECE 621 Linear Aut. Control	3.0

(Students may NOT receive credit for both ECE 621 and ECE 402)

Digital Systems	**Credits**
(F) ECE 434 Fault Tol. Comp.	3.0
(F) ECE 435 Comp. Design	4.5
(S) ECE 436 Adv. Dig. Design	4.5
(F) ECE 457 Comp. Networks	3.0
(F) ECE 563 Intro. To VLSI	3.0
(O) ECE 631 Adv. Sw. Theo.	3.0

Applied Electrophysics	**Credits**
(S) ECE 564 IC Fabrication	3.0
(S) ECE 415 IC Fabrication Lab	1.5
(S) ECE 482 Microwave Lab	1.5
(S) ECE 556 Microwave Engr.	3.0
(F) ECE 563 Intro. To VLSI	3.0
(F) ECE 663 Semicond. Dev. The.	3.0
(S) ECE 409 RF Circuit Design and Wireless Systems	3.0
(S) MSE 567 Prop. Of Materials	3.0
(F) PHYS 531 Optics	3.0
(S) PHYS 532 Fund. Of Photonics	3.0

Communication & Signal Processing	**Credits**
(F) ECE 420 Communications	3.0
(F) ECE 422 Communications Lab	1.5
(S) ECE 482 Microwave Lab	1.5
(S) ECE 556 Microwave Engr.	3.0
(F) ECE 576 Dig. Sig. Proc.	3.0
(F) ECE 613 Comp. Sys. Engr.	3.0

Microelectronics	**Credits**
(S) ECE 407 Prop. Of Materials	3.0
(F) ECE 409 Wireless Circuits	3.0
(F) ECE 435 Comp. Organ. & Des.	4.5
(S) ECE 473 Analog Integrated Cir.	3.0
(F) ECE 563 Introduction to VLSI	3.0
(S) ECE 564 Microelect. IC Fab.	3.0
(S) ECE 415 IC Fabrication Lab	1.5
(S) ECE 409 Wireless Circuits	3.0

APPLIED ELECTROPHYSICS CONCENTRATION AREA

Applied Electrophysics is an area of electrical and computer engineering that incorporates microelectronics, solid-state devices and materials, optics and optoelectronics, and microwave and millimeter-wave engineering. This curriculum is designed as a guide for students wishing to focus on these areas and to prepare them for employment and/or graduate studies in these fields.

Applied Electrophysics plays a major role in technological innovation and is an interdisciplinary area spanning physics, chemistry, materials science and engineering. Students concentrating in applied electrophysics will play a part in the microelectronics revolution that has transformed our world with the advent of lap-top computers, cellular telephones, semiconductor lasers, micro-electromechanical devices, and wireless integrated circuits.

This page provides a suggested program for a person with interests in applied electrophysics. Other programs can be generated with the approval of your faculty advisor.

SIXTH SEMESTER		**CREDITS**
ECE 303	Solid State Device	3.0
ECE 409	RF Circuit Design & Wireless Systems	3.0
TECH 3	Tech. Elective	3.0
ECE--	ECE Elective	3.0
APMA 310	Probability	3.0

SEVENTH SEMESTER		**CREDITS**
PHYS	531 Optics	3.0
MSE	567 Prop. Of Materials	3.0
ECE	ECE Elective	3.0
ECE--	ECE Lab. Elective	1.5
STS	401 West. Tech. & Cult.	3.0

EIGHTH SEMESTER		**CREDITS**
HSS 3	HSS Elective	3.0
ECE 564	IC Fabrication	3.0
ECE 556	Microwave Engr. 1	3.0
ECE	ECE Lab. Elect.	1.5
ECE	ECE Elective	3.0
STS 402	Engr. In Soc.	3.0
UE 3	Unrestricted Elect.	3.0

NOTES:

1. **Technical Elective 1** – PHYS 252E or MSE 210 are **recommended**
2. **Technical Elective 2** – PHYS 355, APMA 315 or ECE 307 are **recommended**
3. **Technical Elective 3** – ECE 324 or ECE 310 are recommended. (NOTE: ECE 324 is a prerequisite for several fourth year electives).
4. **ECE Lab Elective** – At least one lab elective must be chosen from the AEpL area and accompany the appropriate course, e.g., ECE 482 – Microwave Engr. Lab; ECE 415 – IC Fabrication Lab
5. ECE 333 is assumed to have been taken in the 5th semester.
6. ECE 409 will be offered in Spring 2005, Spring 2006 and Spring 2008.
   ECE 473 will be offered in Spring 2005 and Spring 2007.
   ECE 564 will be offered in Spring 2005 and Spring 2007.
   ECE 587 will be offered in Spring 2006 and Spring 2008.

COMMUNICATIONS AND SIGNAL PROCESSING CONCENTRATION AREA

Communications and signal processing is a thriving and exciting area in electrical and computer Engineering, spanning two closely related sub-disciplines: communications, dealing primarily with all aspects of information transmission (e.g., across a wireless, wireline, or satellite network); and signal processing, focusing on problems of information extraction, representation, and transformation (e.g., digital image and video compression, noise/interference reduction).

Careers in communications and signal processing are diverse, and the job market is strong, driven by the ever-growing demand for improved personal wireless communication services, networking and the internet, and multimedia applications. Students who specialize in this area may look forward to exciting careers in the telecommunications industry; information network engineering; internet solution providers; communications service providers; custom signal processing algorithm design, development and implementation for remote sensing, oil exploration, or medical imaging and bioengineering, and numerous others.

This page provides a suggested program of studies for a person interested in communications and signal processing. Other programs can be created with the approval of your faculty advisor.

SIXTH SEMESTER		**CREDITS**
APMA 310	Probability	3.0
ECE 324	Sig. & Sys. II	3.0
ECE 3--	ECE Elective	3.0
TECH 3	Tech. Elective	3.0
HSS 3	HSS Elective	3.0

SEVENTH SEMESTER		**CREDITS**
STS 401	West. Tech. & Cult.	3.0
ECE 420	Communications	3.0*
ECE xxx	ECE Lab.	1.5*
ECE 576	Dig. Signal Proc.	3.0*
ECE	ECE Elective	3.0
UE 2	Unrestricted Elect.	3.0

EIGHTH SEMESTER		**CREDITS**
STS 402	Engr. In Society	3.0
ECE 556	Microwave Engr.	3.0*
ECE 482	Microwave Lab	1.5
TECH 4	Tech. Elective	3.0
ECE --	ECE Elective	3.0
UE 3	Unrestricted Elect.	3.0

NOTES:

*only **two** of the three (ECE 420, ECE 576, ECE 556) and **one** associated lab (either ECE 422, ECE 482 or ECE 578) are required).

**ECE 333 is assumed to have been taken in the 5th semester.

Some Suggested Electives are:

APMA 308 – Linear Algebra
CS 457 – Computer Networks
ECE 484 – Wireless Communications
ECE 485 – Optical Communications
ECE 613 – Comm. Sys. Engr. (for advanced students only)

CONTROL SYSTEMS CONCENTRATION AREA

The control systems specialization within the electrical and computer engineering degree program involves design and analysis of automatic control systems.

A large fraction of engineering systems involve automatic control features. For example, the heating system in a typical home regulates the room temperature at a comfortable level; the autopilot in a passenger aircraft keeps desirable flight speed, altitude and heading; and the cruise control in a car maintains a specified driving speed. The performance of an electronic or mechanical design crucially depends on its control system. The overall demand for control systems is more than ever: from heating, ventilating and air conditioning to electronic, mechanical or power operation, factory automation and process control, to high-precision manufacturing, superhighway or air traffic control and space exploration. Control systems theory also provides tools for other areas such as circuit design, signal processing, communications, biomedical engineering and economics.

Topics of interest to the control systems area of electrical and computer engineering include system dynamics, feedback control design, stability analysis, optimization, robotics, process control, computer-controlled systems and computer-aided control system design. The curriculum found in this brochure has been designed to prepare students for employment and/or graduate studies in these fields.

Other forms of this program are possible with approval of your faculty advisor.

SIXTH SEMESTER SEMESTER		**CREDITS**
APMA 310	Probability	3.0
ECE 324	Sig. & Sys. II	3.0
ECE --	ECE Elect	3.0
TECH 3	Tech. Elect.	3.0
HSS 3	HSS Elect.	3.0

SEVENTH SEMESTER		**CREDITS**:
STS 401	West. Tech. & Cult.	3.0
ECE 402	Lin. Cont. Sys.	3.0
ECE 403	Control Lab	1.5
ECE --	ECE Elective	3.0
ECE --	ECE Elective	3.0
UE 2	Unrestricted Elect.	3.0

EIGHTH SEMESTER		**CREDITS**
STS 402	Engr. In Soc.	3.0
ECE 412	Dig. Cont. Sys.	3.0
ECE --	ECE Lab Elect.	1.5
TECH 4	Tech. Elect.	3.0
ECE --	ECE Elect.	3.0
UE 3	Unrestricted Elect.	3.0

NOTES:
Recommended ECE Electives are:
ECE 310 - Electromech. Energy Conv.
ECE 525 - Intro. To Robotics

Recommended Technical Electives are:
APMA 308, ECE 307 and SYS 32I

ECE 333 is assumed to have been taken in the 5th semester

DIGITAL SYSTEMS CONCENTRATION AREA

The design and analysis of digital systems is an exciting and growing area in Electrical and Computer Engineering, and is available as one of the four areas of specialization in our undergraduate degree program. Digital systems have become part of almost every technology, from medicine and finance, to consumer goods and transportation systems, and range in size from microsystems to personal computers and general-purpose computing systems.

A specialization in digital systems within the Electrical and Computer Engineering degree program emphasizes hardware design and analysis, as well as the software which interfaces to the hardware. Students learn computer organization and digital design methodology through a design-based sequence of courses in the fourth year.

A specialization in digital design relates well to other areas of specialization in Electrical and Computer Engineering, and the flexibility of our undergraduate program allows a student to coordinate a study of digital systems with a study of other Electrical and Computer Engineering topics, including controls, communications, integrated circuits and microwaves. Further, a judicious use of the technical electives allows the combination of digital systems with other engineering disciplines.

Below we provide a suggested program of studies for a person interested in digital systems. Other programs are possible with the approval of your advisor.

SIXTH SEMESTER		**CREDITS**	**SEVENTH SEMESTER**		**CREDITS**
APMA 310	Probability	3.0	STS 401	West. Tech. & Cult.	3.0
ECE 303	Solid State Dev.	3.0	ECE 435	Comp. Org. & Des.	4.5
ECE 3--	ECE Elective	3.0	ECE --	ECE Elective	3.0
TECH 3	Technical Elect.	3.0	ECE	ECE Elect.	3.0
HSS 3	HSS Elect.	3.0	UE 2	Unrestricted Elect.	3.0

EIGHTH SEMESTER		**CREDITS**
STS 402	Engr. In Soc.	3.0
ECE 436	Adv. Dig. Design	4.5
TECH 4	Tech. Elect.	3.0
ECE --	ECE Elect.	3.0
UE 3	Unrestricted Elect.	3.0

NOTES:

Suggested Technical Electives include:
CS 202 - Discrete Math I
CS 216 - Program and Data Representation

Suggested CS Electives include:
CS 414 - Operating Systems
CS 457 - Computer Networks
ECE 434– Fault Tolerant Computing

ECE 333 is assumed to have been taken in the 5th semester.

MICROELECTRONICS CONCENTRATION AREA

As part of the electrical engineering degree program, it is necessary to select one of four areas of specialization during the later years of the degree program. One of these areas of specialization is Microelectronics. Topics of interest to this area of electrical engineering include digital integrated circuit (IC) design, mixed-signal IC design, ASIC design, solid-state electronic materials, and integrated MEMS applications. The curriculum found in this brochure is designed as a guide for students in selecting courses that will prepare them for employment and/or graduate studies in these fields.

These areas of electrical and computer engineering play a major role in technological innovation and serve as an important source of national competitiveness. Microelectronic devices and circuits are used in virtually all new technologies, from lap-top computers to small cell phones, from automotivive emission control systems to missile guidance systems. The microelectronics concentration enables the circuit designer to better appreciate and understand the constraints and device characteristics associated with the physical integrated circuit fabrication process. Similarly, a student intending to pursue a career in microelectronic fabrication will gain appreciation for the needs and limitations of the circuit design process.

This document provides a suggested program for a person with interests in applied electrophysics. Other programs can be generated with the approval of your faculty advisor.

SIXTH SEMESTER		**CREDITS**
ECE 303	Solid State Devices	3.0
ECE 333	Computer Architecture	3.0
ECE 409	RF Circuit Design and Wireless Systems	3.0
TECH 3	Technical Elective	3.0
APMA 310	Probability	3.0
HSS 3	HSS Elective	3.0
HSS 3	HSS Elective	3.0

SEVENTH SEMESTER		**CREDITS**
ECE 563	Intro. To VLSI	3.0
MSE 567	Prop. Of Materials	3.0
STS 401	West. Tech. & Cult.	3.0
UE 2	Unrestricted Elect.	3.0

EIGHTH SEMESTER		**CREDITS**
ECE 564	IC Fabrication	3.0
ECE 415	IC Fabrication Lab	1.5
ECE 473	Analog Integrated Cir.	3.0
	OR	
ECE 409	RF Circuit Design & Wireless Systems	3.0
ECE --	ECE Elective	3.0
STS 402	Engineer in Society	3.0
UE 3	Unrestricted Elective	3.0

NOTES:

1. Tech. Elect. 1 – PHYS 252E or MSE 209 are recommended
2. Tech. Elect. 2 – PHUS 355 or APMA 315 are recommended
3. Tech. Elect. 3 – ECE 324 or ECE 310 is recommended. (ECE 324 is a prerequisite for several fourth year electives).
4. ECE 409 will be offered in Spring 2005, Spring 2006 and Spring 2008.
   ECE 473 will be offered in Spring 2005 and Spring 2007.
   ECE 564 will be offered in Spring 2005 and Spring 2007.
   ECE 587 will be offered in Spring 2006 and Spring 2008.

MINOR PROGRAMS

Electrical Engineering

Students who wish to earn a minor in electrical engineering should complete the following list of courses:

ECE 203 – Introduction to Circuit Analysis
ECE 230 – Digital Logic Design
ECE 204 – Electronics 1

Plus three from the following list (at least one at the 400-level or higher)

ECE 303	ECE 324	ECE 434	ECE 556
ECE 307	ECE 333	ECE 435	ECE 563
ECE 309	ECE 402	ECE 457	ECE 564
ECE 310	ECE 409	ECE 507	ECE 576
ECE 323	ECE 420	ECE 525	

Minors in Other Areas

The Electrical and Computer Engineering Department has prepared brochures describing sample curricula to fulfill a minor in other engineering disciplines while majoring in electrical and computer engineering. Of particular interest are minor programs in **Biomedical Engineering** and **Systems Engineering**. These brochures are available from the Electrical and Computer Engineering Office, C-210 Thornton Hall.

CO-OP PROGRAM
IN ELECTRICAL AND COMPUTER ENGINEERING

Cooperative education is a structured educational strategy integrating classroom studies with a practical work experience in a field related to a student's career goals. It provides experience in integrating theory and practice. The Co-op program provides students the opportunity to obtain a more extended, in-depth work experience than can be obtained in a summer internship. The Electrical and Computer Engineering Co-op program gives students the option of one or two seven-month work assignments in industry. When combined with summer internships a student can gain over one year experience prior to graduation and entry into the permanent workplace. The program is optional and non-credit.

PROGRAM ADMINISTRATION

A. Career Services Office

Marketing of program to students and employers
Student preparation for entering program
Communications with industry and students
Evaluation & feedback of program (student/industry experience)
Coordination of registration

B. Electrical and Computer Engineering Department

Develop and implement program of study
Student advising on academic plans

APPLYING FOR THE CO-OP PROGRAM

A. REQUIREMENTS

Candidates for the Cooperative Engineering Education Program must complete five semesters and have third year academic standing. In addition they must have an overall GPA of 2.5/4.0. Some employers will require a GPA of >3.0/4.0. Application for the co-op program must be made during the Fall semester of the third Year. The candidate must have the recommendation of the faculty advisor. Once selected the candidate must attend a series of workshops as follows:

Resume Preparation
Interviewing Skills
Transition from School to the Workplace

B. COUNSELING

Contact the Engineering Career Services office, A109 Thornton Hall.

C. SELECTING AN EMPLOYER

Engineering Career Services has identified potential Co-op employers from among the quality organizations that recruit at UVA. These companies have agreed to the principles and requirements of a co-op employer. The Director will counsel students and discuss options to guide them in selecting an employer.

Option 1-Complete B. S. program in 4-1/2 years. One 7-month and one summer work assignment:

1. Semester 6 and following summer (Jan-Aug of third year)
2. Summer following fourth year

Students who have not taken ECE 324 should consult the instructor before registering for ECE 412 Digital Control or ECE 420 Communications. Students interested in communications should take APMA 310 in the fifth semester so they can take ECE 420 the semester following their co-op assignment.

Option 2-Complete program in 5 years. Two 7-month work assignments.

1. Semester 6 and following summer (Jan-Aug of third year)
2. Summer and fall following fourth year (May-Dec).

Students who choose this option will not be able to take ECE 576 Digital Signal Processing. If they wish to take ECE 420 Communications, they should take ECE 310 Probability, in the fifth semester.

OPTIONS 1 and 2

SEMESTER 1	**SEMESTER 2**
APMA 111	APMA 212
CHEM 151/151L	PHYS 142E
ENGR 162	CS 101
STS 101	SCI ELECTIVE
	HSS

SUMMER INTERNSHIP

SEMESTER 3	**SEMESTER 4**
APMA 213	MATH ELECTIVE
PHYS 241E/241L	ECE 204
CS 201	ECE 230
ECE 203	TECH. ELECTIVE
HSS	STS 2--

SEMESTER 5	**SEMESTER 6**
ECE 309	CO-OP WORK
ECE 323	ECE LAB
ECE 333	APMA 310
UNRESTRICTED	

SUMMER CO-OP WORK

SEMESTER 7	**SEMESTER 8**
STS 401	STS 402
ECE ELECTIVE	ECE ELECTIVE
ECE ELECTIVE	ECE ELECTIVE
TECH. ELECTIVE	ECE LAB
HSS	ECE/CS ELECTIVE
	UNRESTRICTED

SUMMER CO-OP WORK

OPTION 1

SEMESTER 9
ECE ELECTIVE
ECE ELECTIVE
ECE LAB
TECH. ELECTIVE
TECH. ELECTIVE
UNRESTRICTED

OPTION 2

SUMMER COOP WORK

SEMESTER 9	**SEMESTER 10**
CO-OP WORK	ECE ELECTIVE
	ECE ELECTIVE
	TECH. ELECTIVE
	TECH. ELECTIVE
	UNRESTRICTED

CONTACTS AT UVA
C. J. Livesay
Engineering Career Services
Office of the Dean
School of Engr. & Applied Science
Thornton Hall
Charlottesville, VA 22904
Phone: 434/924-3050

ACADEMICS
Zongli Lin, Chair
Undergraduate Committee,
Department of Electrical & Comp. Engr.,School of Engr. & Applied Science
E313 Thornton Hall
Charlottesville, VA 22904
Phone: 434/924-6342

OFFICE OF THE DEAN
SCHOOL OF ENGINEERING AND APPLIED SCIENCE
UNIVERSITY OF VIRGINIA

HUMANITIES AND SOCIAL SCIENCE (HSS) ELECTIVE REQUIREMENTS

Guidelines and Procedures

REVISED FOR 2004-2005

1. Studies in the humanities and social sciences serve not only to meet the objectives of a broad education, but also to meet the objectives of the engineering profession.

   Such course work must meet the generally accepted definitions that the humanities are the branches of knowledge concerned with man and his culture, while the social sciences are the studies of society. Examples of traditional subjects in these areas are philosophy, religion, history, literature, fine arts, sociology, psychology, political science, anthropology, economics, and foreign languages other than a student's native language(s). Non-traditional subjects are exemplified by courses such as technology and human affairs, history of technology, and professional ethics and social responsibility.

   With your advisor's approval, you may select your HSS electives from the list of courses presented below. Courses that instill cultural values are acceptable while skill development courses are not. Consequently, courses that involve performance must be accompanied by theory or history of the subject. **Courses on communication in the student's native language, regardless of their level, may not be used to satisfy this requirement.**

2. Students may petition the Assistant Dean for Undergraduate Programs for approval of other courses not on the approved list.

3. University seminars (USEM) will be evaluated on a case-by-case basis upon request. A course description should follow accompany the request.

HSS ELECTIVE REQUIREMENTS

a. Instructional categories generally acceptable for HSS elective credit. A student may normally take any course under any one of these categories, ***with the exception of those listed under b***.

AAS	**ENCR**	**GREE**	**LING**	**PSYC**	**SLAV**
AMEL	**ENEC**	**HEBR**	**LNGS**	**RELA**	**SLFK**
AMTR	**ENGL**	**HIAF**	**MDST**	**RELB**	**SOC**
ANTH	**ENGN**	**HIEA**	**MSP**	**RELC**	**SPAN**
AR H	**ENLS**	**HIEU**	**MUSI**	**RELG**	**SPTR**
ARAB	**ENLT**	**HILA**	**PERS**	**RELH**	**SRBC**
ASL	**ENMD**	**HIME**	**PETR**	**RELI**	**STS**
ARTH	**ENNC**	**HIND**	**PHIL**	**RELJ**	**SWAG**
BULG	**ENRN**	**HISA**	**PLAD**	**RELH**	**SWAH**
CHIN	**ENSP**	**HIST**	**PLAP**	**RELI**	**SWED**
CHTR	**ENTC**	**HIUS**	**PLCP**	**RELS**	**TURK**
CLAS	**ENWR**	**ITAL**	**PLIR**	**RUSS**	**UKR**
CPLT	**FREN**	**ITTR**	**PLPT**	**RUTR**	**URDU**
CZ	**FRTR**	**JAPN**	**POL**	**SANS**	
ECON	**GERM**	**JPTR**	**PORT**	**SATR**	
ENAM	**GETR**	**LATI**	**POTR**	**SCAN**	

b. **Exceptions** to 2.a., (i.e., courses in the acceptable categories that are ***not*** suitable for HSS elective credit, generally because of their specialized nature for majors in that field or because they are predominantly skills courses):

ANTH 109, 381, 382, 401, 496, 497, 498, 508, 580, 587, 588, 590
ECON 311, 371, 372, 381, 401, 435, 471, 509, 510
ENWR 103, 105, 106, 110, 210, 220
MDST 110, 348, 375
MUSI 131, 151-158, 193, 194, 230A, 230B, 261, 293, 294, 311, 331-336, 339, 351-358, 360-369, 393, 394

PSYCH 220-222, 305, 306, 321, 385-387, 395, 396, 401-409, 420, 481, 491-498, 493, 494, 520, 521, 523-527, 529, 531, 532, 533, 535
SOC 219, 311, 480, 481, 482, 497, 510, 511, 512, 595, 596
STS 395

UNRESTRICTED ELECTIVE REQUIREMENTS

Unrestricted Electives may be chosen from any graded course in the University *except* mathematics courses below MATH 131, including STAT 110 and 112, and courses that substantially duplicate any others offered for the degree, including PHYS 201, PHYS 202, CS 110, CS 111, CS 120, or any introductory programming course. Students in doubt as to what is acceptable to satisfy a degree requirement should obtain the approval of their adviser and the dean's office, Thornton Hall, Room A122. APMA 109 counts as a three credit unrestricted elective for students.

Appendix II - Computer Resources and Electronic Mail

The Stacks Computing Facility, located in Thornton Hall (A233), provides a complete, modern environment to support student computing activities. The facility, maintained by ITC (Information Technology and Communications), contains personal computers and printers connected to the University network. Students use these computers for many applications, including computer programming, engineering graphics design, word processing and spreadsheet analyses. The Stacks Computing Facility is available to all University students and is **usually open 24 hours a day.**

All students should obtain an E-mail account from ITC during registration. At that time students are given a UVA computing ID and password. E-mail is an easy way for students to communicate with faculty, staff and other students, here and at other institutions. E-mail and newsgroups are primary methods used by the Department to communicate important information.

For more information and support, connect to ITC's web site at: **http://www.itc.virginia.edu** or contact the ITC Help Desk at 924-3731.

A newsgroup **(uva.ee.ugrads)** has been set up for the ECE Department Undergraduates so we can post news of anything important going on within the Department. Please get into the habit of reading your news so you won't miss out on important messages from the Department. If you need more information on subscribing to, reading and posting to newsgroups, you can contact the ITC Help Desk at the above phone number.

Two email lists, **eemajors@virginia.edu**, for electrical engineering majors, and **cpe-students@virginia.edu**, for computer engineering majors, have been created to enable the ECE Department to send important information via email to all undergraduate electrical engineering and computer engineering students. These lists are **NOT** intended for mailing list members to communicate with each other. Broadcast messages on major events and curricula changes will be posted to these mailing lists. In order to receive these messages you must subscribe to the following list at url: **http://list.mail.virginia.edu/mailman/listinfo/eemajors**. Scroll down to "subscribing to eemajors" fill out the form and click on "subscribe". Example below.

eemajors -- EE Majors Mailman Mailing List

About eemajors	English (USA)

The eemajors@Virginia.edu Mailman mailing list is used to distribute information to EE majors at the University of Virginia.

To see the collection of prior postings to the list, visit the eemajors Archives. (*The current archive is only available to the list members.*)

Using eemajors

To post a message to all the list members, send email to ee-majors@virginia.edu.

You can subscribe to the list, or change your existing subscription, in the sections below.

Subscribing to eemajors

Subscribe to eemajors by filling out the following form. You will be sent email requesting confirmation, to prevent others from gratuitously subscribing you. This is a private list, which means that the list of members is not available to non-members.

Your email address:	
Your name (optional):	

You may enter a privacy password below. This provides only mild security, but should prevent others from messing with your subscription. **Do not use a valuable password** as it will occasionally be emailed back to you in cleartext.

If you choose not to enter a password, one will be automatically generated for you, and it will be sent to you once you've confirmed your subscription. You can always request a mail-back of your password when you edit your personal options.

Pick a password:	
Reenter password to confirm:	
Which language do you prefer to display your messages?	English (USA)
Would you like to receive list mail batched in a daily digest?	No Yes

Subscribe

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eemajors Subscribers

(*The subscribers list is only available to the list members.*)

Enter your address and password to visit the subscribers list:

Address: Password: Visit Subscriber List

To unsubscribe from eemajors, get a password reminder, or change your subscription options enter your subscription email address:

Unsubscribe or edit options

If you leave the field blank, you will be prompted for your email address

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APPENDIX III – ECE FACULTY AREAS OF INTEREST

SCOTT T. ACTON (instr. # 1596) **Professor and Director, VIVA** **(acton@virginia.edu)**	**Signal, Image and Video Processing**
JAMES H. AYLOR (instr. # 6042) **Louis T. Rader Professor and Dean, SEAS** **(jha@virginia.edu)**	**Design Automation, Digital Systems , Test Technology**
N. SCOTT BARKER (instr. # 3894) **Associate Professor** **(barker@virginia.edu)**	**Application of Microelectromechanical Systems (MEMS) to Microwave and Millimeter-wave Circuits**
JOHN C. BEAN (instr. # 6734) **John Marshall Money Professor** **(john-bean@virginia.edu)**	**Molecular Beam Epitaxy, Novel Electronic Materials**
TOBY BERGER (instr. # A480) **Professor** **(tb6n@virginia.edu)**	**Information Theory, Random Fields, Communication Networks, Video Compression, Signature Verification, Coherent Signal Processing**
TRAVIS N. BLALOCK (instr. # 8134) **Associate Professor** **(tblalock@virginia.edu)**	**Mixed-Signal CMOS VLSI Design. Analog CMOS Signal Processing Design, Silicon Backplane Microdisplays**
RICHARD BRADLEY (instr. # 4075) **Visiting Research Assistant Professor** **(rbradley@virginia.edu)**	**Microwave and Millimeter Wave Semiconductor Devices and Integrated Circuitry; Radio Astronomy Instrumentation**
MAITE BRANDT-PEARCE (instr. # 4032) **Associate Professor** **(mb9q@virginia.edu)**	**Communications Theory, Optical Communications, Multiuser Networks**
BENTON H. CALHOUN (instr. # C071) **Assistant Professor** **(bcalhoun@virginia.edu)**	**Digital Integrated Circuits, Memory Design Circuits, Sub-Threshold Digital Operation, Low-Power VLSI**
JOE C. CAMPBELL (instr. # C081) **Lucien Carr III Professor** **(jccuva@virginia.edu)**	**Si-Based Optoelectronics,; High Speed, Low Noise Avalanche Photodiodes; GaN Ultraviolet Photodectors; Quantum-Dot IR Imaging, Semiconductor Lasers**
THOMAS W. CROWE (instr. # 3436) **Visiting Research Professor** **(twc8u@virginia.edu)**	**High Frequency Solid-State Devices, Novel Solid-State devices, Terahertz Sources and Receivers**
JOANNE BECHTA DUGAN (instr. # 4022) **Professor & Director, Computer Engineering (CpE) Program** **(jbd@virginia.edu)**	**Reliability Analysis of Hardware and software Fault Tolerant Computer Systems; Dynamic Fault Tree Models; Markov Models; Simulation**
BORIS L. GELMONT (instr. # 3554) **Research Associate Professor** **(gb7k@virginia.edu)**	**Semiconductor Device Physics; Device Modeling**
AVIK GHOSH (instr. # B665) **Assistant Professor** **(ag7rq@virginia.edu)**	**Nanoscale Transport; Nanoscale Optics; Atomistic Theory of Electronic Conduction**
TED C. GIRAS (instr. # 1794) **Visiting Research Professor** **(tedgiras@earthlink.net)**	**Risk Assessment, Modeling and Monte Carlo Simulation of Large-scale Safety Critical Systems such as processor-based Statistical Signaling and Train Control Systems; High-speed Maglev Train Systems and Intelligent Ground Transportation Systems**
TATIANA GLOBUS (instr. # 4465) **Research Associate Professor** **(tg9a@virginia.edu)**	**Electronic and Photonic Materials and devices, Processing and Characterization**
Mool C. Gupta (instr. # B479) **Langley Professor** **(mgupta@virginia.edu)**	**Photonics; Advanced Sensors**

LLOYD R. HARRIOTT (instr. #1618) **Virginia Microelectronics Consortium Professor and Chair** **(lrharriott@virginia.edu)**	**Microelectronics, Particularly Lithography, Nanofabrication , Nanostructures, and Electron and Ion Beam Induced Processes**
JEFFERY L. HESLER (instr. # 8034) **Visiting Research Assistant Professor** **(jlh6r@virginia.edu)**	**Microwave, Millimeter and Submillimeter Wave Devices and Circuit Devices**
ARCHIE HOLMES, JR. (instr. # C933) **Professor** **(ah7sj@virginia.edu)**	**Epitaxial Growth of III-V Semiconductors, Nanostructures, Electronic & Optoelectronic Devices**
BARRY W. JOHNSON (instr. # 2215) **Professor and Senior Associate Dean, SEAS** **(bwj@virginia.edu)**	**Fault Tolerant Systems, VLSI Testing, VLSI Systems**
JOHN C. LACH (instr. # 1619) **Associate Professor** **(jlach@virginia.edu)**	**Embedded (especially real-time) Systems. Specific Focuses within this area Include Integrated Circuit (I) Computer-aided Design (CAD) Algorithms, Field Programmable Gate Arrays (FPGA's), Processor Architecture and Low Power Design**
ARTHUR LICHTENBERGER (instr. #0284) **Research Associate Professor** **(awl1l@virginia.edu)**	**Superconducting Materials and Devices**
ZONGLI LIN (instr. # 7424) **Professor** **(zl5y@virginia.edu)**	**Nonlinear Control Theory, Control of Systems Subject to Actuator Saturation, Robust Control Theory, Computer-aided Control System Design and Control Applications**
P. PAXTON MARSHALL (instr. # 4079) **Professor and Associate Dean of Undergraduate Programs, SEAS** **(ppm5y@virginia.edu)**	**Electric Power and Machinery, Power Electronics, Energy Conversion, Renewable Energy**
MICHAEL L. REED (instr. # 7426) **Professor** **(reed@virginia.edu)**	**Electronic and Biomedical Applications of Microelectromechanical Systems (MEMS), and the Development of new Microfabrication Technologies**
SETH D. SILVERSTEIN (instr. # 9613) **Visiting Research Professor** **(ss3kx@virginia.edu)**	**Statistical and Array Signal Processing, Wireless/Satellite Communications, Radar Systems, Phased Array Calibration and Beam Pattern Control systems, and Coherent Imaging Applied to Optical, Microwave Medical Ultrasound, and Seismic Imaging Systems**
MIRCEA R. STAN (instr. # 6414) **Associate Professor** **(mrs8n@virginia.edu)**	**Low-Power VLSI, Fagan and Reconfigurable Computing, and Hardware/Software Codesign, Analogs and Systems Digital VLSI**
NATHAN SWAMI (instr.# B087) **Assistant Professor & Graduate Program Director** **(nathanswami@virginia.edu)**	**Molecular Devices – Electronics, Sensing and Manipulation of Molecules**
GANG TAO (instr. # 1935) **Professor** **(gt9s@virginia.edu)**	**Adaptive Control, Nonlinear Systems, Control Applications, Multivariables**
M. VEERARAGHAVAN (instr. # A280) **Professor** **(mv5g@virginia.edu)**	**Networking Architectures and Protocols, Wireless Networks, Optical Networks, Computer Architecture**
ROBERT M. WEIKLE (instr. # 2783) **Associate Professor** **(rmw5w@virginia.edu)**	**Microwave and Millimeter Wave Circuits and Radiating Structures**
RONALD D. WILLIAMS (instr. # 2940) **Associate Professor** **(rdw@virginia.edu)**	**Computer Design, Real-time Systems, VLSI Design/VLSI Testing**
STEPHEN G. WILSON (instr. # 3438) **Professor and Associate Chair** **(sgw@virginia.edu)**	**Communications and Information Theory**

Appendix IV - Some Academic Regulations

Consult the UVa Undergraduate Record for details.

Academic Warning/Probation/Suspension

Students are expected to maintain a 2.0 GPA. Failure to maintain this average will result in one of these penalties.

Repeating Courses

A student who has received the grade of "D+" or lower in a fundamental course may be required to repeat that course as the Departmental faculty may direct.

Course Load

The normal undergraduate course load is 15-18 credits, unless the student is on probation, in which case a course load of 12 to 15 credits is recommended. A semester load of less than 15 credits requires the approval of the faculty advisor and the Assistant Dean for Undergraduate Affairs, which will be granted only for exceptional circumstances. This includes dropping below 15 credits after the semester has begun. A petition may be obtained in A122, Thornton Hall. Students with a 3.0 or better may register for 19 or 20 hours if approved by their faculty advisor. Students wishing to register for 21 or more hours must have a GPA of 3.6 or better and obtain approval of faculty advisor and Dean.

Dropping and Withdrawing from a Course

With the approval of the student's adviser, a student may drop and void registration in a course anytime up to the official drop date (about the middle of the semester), unless such action will reduce the student's credit load to less than 15, in which case special approval must be obtained as described above. After the drop date, a student must petition the Office of the Dean to withdraw from a course, and permission to do so will only be granted when there are extenuating circumstances. (Merely stating that you are doing poorly or even in danger of failing is not sufficient). A student who is permitted to withdraw from a particular course will receive a "WP" (withdraw passing) or "WF" (withdraw failing).

Accelerated Bachelor's/Master's Program

Outstanding students (GPA of 3.4 or better) can be admitted to the program in their third year. Applications are usually due in January. See Dr. Lin for details.

Appendix V - Code of Ethics of the IEEE

We, the members of the IEEE, in recognition of the importance of our technologies in affecting the quality of life throughout the world, and in accepting a personal obligation to our profession, its members and the communities we serve, do hereby commit ourselves to the highest ethical and professional conduct and agree*:*

1. to accept responsibility in making engineering decisions consistent with the safety, health and welfare of the public, and to disclose promptly factors that might endanger the public or the environment;

2. to avoid real or perceived conflicts of interest whenever possible, and to disclose them to affected parties when they do exist;

3. to be honest and realistic in stating claims or estimates based on available data;

4. to reject bribery in all its forms;

5. to improve the understanding of technology, its appropriate application, and potential consequences;

6. to maintain and improve our technical competence and to undertake technological tasks for others only if qualified by training or experience, or after full disclosure of pertinent limitations;

7. to seek, accept, and offer honest criticism of technical work, to acknowledge and correct errors, and to credit properly the contributions of others;

8. to treat fairly all persons regardless of such factors as race, religion, gender, disability, age, or national origin;

9. to avoid injuring others, their property, reputation, or employment by false or malicious action;

10. to assist colleagues and co-workers in their professional development and to support them in following this code of ethics.

Approved by the IEEE Board of Directors
August 1990

ELECTRICAL and COMPUTER ENGINEERING
DEPARTMENTAL AWARDS

Each year, the Electrical and Computer Engineering Department recognizes the outstanding undergraduate students and graduate students who have worked exceptionally hard. Listed below are the awards given for the 2004 and 2005 academic years.

THE JAMES S. MILLER AWARD - This award, in honor of Dr. James Shannon Miller, Jr., who served our faculty from 1920 to 1970, recognizes the outstanding third-year student in Electrical and Computer Engineering as judged by the Electrical and Computer Engineering Faculty.

Recipients of the **James S. Miller Award** for the past two years were:

2006	**2007**
Owen Miller	**Gary Shambat**

THE LOUIS T. RADER CHAIRPERSON'S and GRADUATE RESEARCH AWARDS - These awards, established and fully funded by Dr. Louis T. Rader, who served our faculty as Chairman from 1969-1974, recognizes the graduating senior(s) and graduate student(s) who deserves recognition because of their performance in the areas of: (1) academic ability, (2) ability to get along with people, and (3) demonstrated ability to work hard.

Recipients of the **Louis T. Rader Chairperson's Award** for the past two years were:

2006	**2007**
Marija Cvijetic	**Fang-chi Chang**
Adam Showalter	**Christopher Palmer**
P. Case Taintor	**Peter Siy**

Recipients of the **Louis T. Rader Graduate Research Award** for the past two years were:

2006	**2007**
Haijun Fang	**Zhijian Lu**
Xiaowei Li	**Erkin Seker**

NEW FACULTY TEACHING AWARD, FACULTY EDUCATIONAL INNOVATION AWARD and THE OUTSTANDING GRADUATE TEACHING ASSISTANT AWARD - These awards, initiated by Professor Steve Wilson and his wife, Lynanne, recognizes the outstanding Graduate Teaching Assistant, and outstanding Junior-Level Faculty Member of the Electrical and Computer Engineering Department.

Recipients of the **Outstanding GTA Award** for the past two years were:

2006	**2007**
Sean Happel	**Katherine Outland**
Yu Liu	**Jonathan Bolus -**
Erkin Seker	**(UVA Outstanding GTA Award)**

Recipients of the **New Faculty Teaching Award** for the past two years were:

2006	**2007**
Dr. N. Scott Barker	**Dr. Avik Ghosh**

Recipients of the **Faculty Educational Innovation Award** for the past two years were:

2006	**2007**
Dr. P. Paxton Marshall	**(no award given)**

THE WILLIAM L. EVERITT STUDENT AWARD FOR EXCELLENCE - This award, presented by the International Engineering Consortium, recognizes students who **(a)** are currently enrolled in their senior year**, (b)** major in either Electrical Engineering, Computer Engineering, or Computer Science, **(c)** rank in the top 10% of their class, and **(d)** have professional interests and activities.

Recipients of the **William L. Everitt Student Award for Excellence** for the past two years were:

2006	**2007**
Jeeyoung Byun	**Ernest Bowden**
Atul Khasla	**Owen Miller**

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