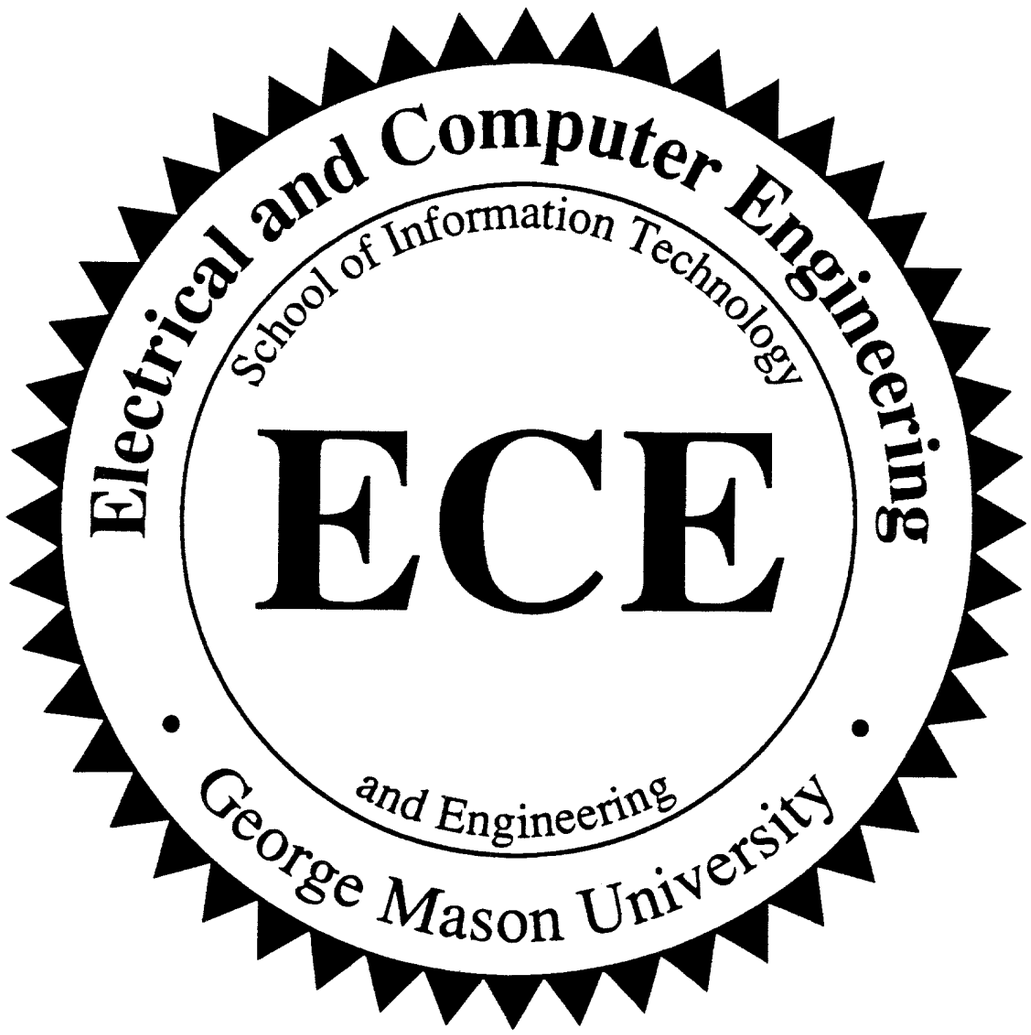
Computer Engineering
and
Electrical Engineering

Bachelor of Science Degree Programs



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http://ece.gmu.edu email: ece@gmu.edu

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BACHELOR of SCIENCE DEGREE PROGRAMS
in
COMPUTER ENGINEERING
and
ELECTRICAL ENGINEERING

The undergraduate Computer Engineering (CpE) and Electrical Engineering (EE) programs offered by the Electrical and Computer Engineering (ECE) Department are designed to prepare the student for either graduate study or direct entry into a career in engineering.

The general university, collegiate, and CpE and EE course requirements are outlined on the sample schedules given in the appropriate degree program sections.

Advising

All CpE and EE students are required to see their advisor prior to course registration each semester. Students interested in computer or electrical engineering who have not declared a major are also strongly urged to obtain advising at the ECE Department office.

Graduate Degree Programs

The ECE Department also offers Master of Science degrees in Computer Engineering, Electrical Engineering, Telecommunications, Computer Forensics and a PhD in Electrical and Computer Engineering. A PhD in Information Technology with a specialization in EE or CpE is offered through The Volgenau School of Information Technology and Engineering. Separate brochures describing these degree programs are available upon request.

Objectives of the Electrical Engineering and Computer Engineering Programs

- Technical Knowledge
  Graduates will be able to apply the fundamentals in the appropriate engineering discipline as demonstrated by success as productive engineers in industry or government or in graduate school.

- Preparation for Further Study
  Graduates will have the knowledge and skills to engage in lifelong learning.

- Professionalism
  Graduates will have the skills and understanding needed to fulfill their professional responsibilities as engineers, including written and oral communication, ethics, societal considerations and teamwork.

For Additional Information

Inquiries concerning any computer or electrical engineering course of study should be directed to Dr. Andre Manitius, Chairman, Electrical and Computer Engineering Department or Dr. William G. Sutton, Associate Chair. 703-993-1569; email: **ece@gmu.edu**; web page: **http://ece.gmu.edu**; Engineering Building, room 3100.

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BACHELOR of SCIENCE in ELECTRICAL ENGINEERING

The electrical engineering program is accredited by ABET (formerly the Accreditation Board for Engineering and Technology). The curriculum places an emphasis on developing analytical abilities and design skills in electrical engineering. More specific goals of the program are to provide the graduates with the following attributes:

- a sound foundation in the basic sciences, mathematics and engineering
- understanding of the fundamentals of design and analysis of computers, electronics, communications, and control systems and robotics, essential for a successful career and for lifelong learning.
- laboratory experience stressing experimentation methods to confirm basic principles.
- ability to use computers for analysis purposes and familiarity with available software tools.
- design experience in engineering problems by both classroom assignments and active participation in design projects, including team projects.
- the ability to communicate well orally and in writing with both engineering professionals and people in other disciplines.
- an appreciation of engineering's impact on society and the professional responsibilities of engineers.

The curriculum includes nine hours of senior technical electives, two hours of advanced engineering labs and a Senior Design Project which may be used for specialization in one of the five areas of bioengineering, computer engineering, electronics, communications and signal processing, and control systems and robotics if desired.

Career opportunities exist in the areas of basic research, product design, software engineering, project engineering, engineering management, engineering consultancy, technical sales and many others.

Recent George Mason electrical engineering graduates have gone on to graduate work at highly competitive institutions such as MIT, Stanford, Cornell and California Institute of Technology, and as working engineers at high technology companies and government agencies such as BAE, BDM, General Electric, Hughes, IBM, INTEL, Lockheed-Martin, MCI, MITRE, NASA, Naval Research Lab, Orbital Sciences and TRW.

REQUIRED COURSES SHOWN IN A SAMPLE SCHEDULE
FOR
B.S. IN ELECTRICAL ENGINEERING
(See page 6 for Bioengineering Concentration Requirements)

1st Semester	*Lec. Hrs.*	*Lab Hrs.*	*Credits*
MATH 113 Analytic Geometry & Calculus I	4		4
ENGR 107 Engineering Fundamentals	2		2
CS 112 Computer Science I	3	2	4
ENGL 101 English Composition	3		3
ECON 103 MicroEconomics	3		3
			16
2nd Semester			
MATH 114 Calculus II	4		4
ECE 101 Information Technology for Electrical Engineers	3	2	3
PHYS 160 University Physics I	3		3
PHYS 161 University Physics I Lab		3	1
CS 222 Computer Programming for Engineers	3		3
			14
3rd Semester			
MATH 213 Calculus III	3		3
MATH 203 Matrix Algebra	3		3
PHYS 260 University Physics II	3		3
PHYS 261 University Physics II Lab		2	1
ECE 201 Introduction to Signal Analysis	3	1	3
Literature Course [3]	3		3
			16
4th Semester			
MATH 214 Differential Equations [4]	3		3
PHYS 262 University Physics III	3		3
PHYS 263 University Physics III Lab		2	1
ECE 280 Electric Circuit Analysis	4	2	5
ECE 220 Signals and Systems I	3	1	3
			15
5th Semester			
ECE 320 Signals and Systems II	3	1	3
ECE 331 Digital System Design	3		3
ECE 332 Digital Systems Design Lab		3	1
ECE 333 Linear Electronics I	3		3
ECE 334 Linear Electronics I Lab		3	1
STAT 346 Probability for Engineers	3		3
Fine Arts General Education Elective [8]	3		3
			17

[1] GMU requires 45 hours of courses numbered 300 or above to be submitted as part of the required degree program courses when applying for graduation. If you transferred to GMU you may need to take extra course work to meet this requirement. **Note, transfer courses labeled with an "L" in the GMU equivalent course do *not* count towards the 45 hours of "300 level or above" courses.** These transfer courses **do** "count" toward satisfying the specifically required BSEE courses. See Dr. Sutton if you have any credit hours of "L" labeled transfer courses that you are intending to apply towards the GMU BSEE degree, to discuss your options.

[2] The Volgenau School requires 24 hours of approved social science and humanities course work. This is normally satisfied by the 24 hours of university general education courses. **All transfer students, even those with associates or bachelors degrees, must also meet this requirement.** This may require taking additional course work to meet this requirement. See Dr. Sutton for approved additional courses.

[3] Literature courses include (but are not limited to): ENGL 201; Chinese 310, 311, 325, 328 (in English); French 325, 329 (in English); German 325 (in English); Russian 325-327 (in English); Spanish 325 (in English); Foreign Languages 330 (in English); CLAS 250, 260, 340, 350, 360, 380; and PHIL 253. The ECE Department will announce additional approved literature courses as they become available.

6th Semester	*Lec. Hrs.*	*Lab Hrs.*	*Credits*
ECE 421 Classical Systems and Control Theory [5]	3		3
ECE 433 Linear Electronics II [5]	3		3
ECE 445 Computer Organization [5]	3		3
ECE 460 Communication and Information Theory [5]	3		3
COMM 100 Intro to Oral Communications	3		3
			15
7th Semester			
ENGL 302 Advanced Composition (For Nat. Sci. and/or Tech.)	3		3
ECE 305 Electromagnetic Theory	3		3
Advanced Engineering Lab [6]		3	1
Technical Elective [7]	3		3
Global Understanding General Education Elective [8]	3		3
ECE 491 Engineering Senior Seminar	1		1
ECE 492 Senior Advanced Design Project I	1		1
			15
8th Semester			
ECE 493 Senior Advanced Design Project II	2		2
Advanced Engineering Lab [6]		3	1
Technical Elective [7]	3		3
Technical Elective [7]	3		3
HIST 100 History of Western Civilization or HIST 125, Introduction to World History	3		3
			12

[4] Students are strongly encouraged to try to plan a math sequence that will allow taking MATH 214, Differential Equations, *prior* to ECE 220. I.e. Summer classes, AP credits.

[5] Students desiring to "lighten" their course load during this semester are advised to consider taking only two or three of these courses depending on their interests or need for the corresponding course material as prerequisites for specific technical electives to be taken in the 7th or 8th semester, or for their Senior Design Project. Students planning on postponing ECE 460 are advised to move the Probability course into the semester just before taking ECE 460 (substituting a course such as ECE 305 or a non-technical General Education elective course for the relocated 5th semester Probability course.)

[6] Advanced Engineering Laboratory Courses

BENG 402	Bioengineering Instrumentation and Design Lab	ECE 447	*Single-Chip Microcomputer
		ECE 461	Communication Engineering Lab
ECE 429	Control Systems Lab	ECE 467	Network Implementation Lab
ECE 434	Linear Electronics II Lab	ECE 448	*FPGA and ASIC Design woth VHDL:
ECE 435	Digital Circuit Design Lab		

*(credit for one technical elective and one advanced laboratory course)

[7] Students may select from the 400 level (and with permission 500 level) courses listed on pages 4 - 5 for their 9 hours of Technical Electives. One Technical Elective may be selected from an approved list of courses offered outside the Department (See list on page 4). Students have the option of having their technical area concentration shown on their transcript by selecting their Technical Electives from one of the Concentrations outlined on pages 6 - 8. *The design content of the 9 hours of senior technical electives must total at least 3.0.*

[8] The Global Understanding elective and the Fine Arts elective should be selected from the Department's lists of approved courses. See list of Approved Global Understanding Electives on pages 20 - 21. See list of Approved Fine Arts Electives on page 22.

[9] The General Education Synthesis requirement is met by satisfactory completion of ECE 492/493 or BENG 492/493.

[10] No C- or D grades in ECE, BENG or ENGR courses can be submitted for the BSEE degree.

BSEE TECHNICAL ELECTIVE COURSES and DESIGN CONTENT

Senior Level Courses

Course		*(Credits:Lect.Hrs.:Lab Hrs.)*	*Design Content*
BENG 401	Bioengineering Instrumentation and Design	(4:3:3)	1.0
ECE 410	Prin. of Discrete-Time Signal Processing	(3:3:0)	1.5
ECE 422	Digital Control Systems	(3:3:0)	1.0
ECE 430	Principles of Semiconductor Devices	(3:3:0)	1.0
ECE 431	Digital Circuit Design	(3:3:0)	1.0
ECE 437	Principles of Microelectronic Device Fabrication	(3:2:1)	1.0
ECE 447	Single-Chip Microcomputers	(4:3:3)	2.0
(credit for one technical elective and one advanced laboratory course)			
ECE 448	FPGA and ASIC Design with VHDL	(4:3:3)	2.0
(credit for one technical elective and one advanced laboratory course)			
ECE 450	Introduction to Robotics	(3:3:0)	1.5
ECE 462	Data and Computer Communications	(3:3:0)	1.0
ECE 463	Digital Communications Systems	(3:3:0)	1.0
ECE 464	Modern Filter Design	(3:3:0)	1.5
ECE 465	Computer Networking Protocols	(3:3:0)	1.0
ECE 499	Special Topics in Electrical Engineering	(3:3:0)	Topic Dependent

Graduate Courses Open to Approved Advanced Undergraduate Students Only

(Grade of B in undergraduate prerequisites and PoI required)

ECE 511	Microprocessors (not if ECE 447 is taken)	(3:3:0)	1.0
ECE 513	Applied Electromagnetic Theory	(3:3:0)	1.0
ECE 520	Applications of Analog/Digital Integrated Circuits	(3:3:0)	1.5
ECE 521	Modern Systems Theory	(3:3:0)	1.0
ECE 528	Intro to Random Processes in Elect. & Comp. Engr.	(3:3:0)	0
ECE 535	Digital Signal Processing	(3:3:0)	1.0
ECE 537	Introduction to Digital Image Processing	(3:3:0)	1.0
ECE 548	Sequential Machine Theory	(3:3:0)	0
ECE 549	Theory & App of Artificial Neural Networks	(3:3:3)	0.5
ECE 563	Introduction to Microwave Engineering	(3:3:0)	1.0
ECE 565	Introduction to Optical Electronics	(3:3:0)	1.0
ECE 567	Optical Fiber Communications	(3:3:0)	1.0
ECE 584	Semiconductor Device Fundamentals	(3:3:0)	0.5
ECE 586	Digital Integrated Circuits	(3:3:0)	1.5
ECE 587	Design of Analog Integrated Circuits	(3:3:0)	1.5
ECE 590	Selected Topics in Engineering	(3:3:0)	Topic Dependent

ELECTRICAL ENGINEERING TECHNICAL ELECTIVES OUTSIDE THE ECE DEPARTMENT

In general, the senior technical electives are approved 400 or 500 level Electrical and Computer Engineering courses. However, with the approval of an advisor, one technical elective may be selected from the following list of courses (exceptions to this list may be granted only by the chairman). Since technical electives from outside the Department carry zero design content, a careful consideration of all three technical electives must be made to ensure the full amount of design content is contained in the two ECE courses.

Discipline	*Approved Courses*
CS	All 300 and 400 level except 305, 306, 365, 465, 491, 490 - 499
MATH	All 300 and 400 level except 301, 302, 351, 400, 431, and 491-499
PHIL	376
PHYSICS	306, 307, 308, 310, 402, 512, 513
SYST	330, 469

TECHNICAL ELECTIVES and ADVANCED LABS LISTED by ELECTRICAL ENGINEERING AREA

COMMUNICATIONS and NETWORKS

Course		*Prerequisites*
ECE 410	Principles of Discrete-Time Signal Processing	ECE 320, STAT 346
ECE 461	Communication Engineering Laboratory	Corequisite ECE 460
ECE 462	Data and Computer Communication	STAT 346
ECE 463	Digital Communication Systems	ECE 460
ECE 464	Modern Filter Design	ECE 320
ECE 465	Computer Networking Protocols	CS 112, STAT 346
ECE 467	Network Implementation Lab	ECE 462
ECE 528	Intro to Random Processes in Elec. & Comp. Engnrg	ECE 320, STAT 346
ECE 535	Digital Signal Processing	ECE 528
ECE 567	Optical Fiber Communications	ECE 565

COMPUTERS

ECE 431	Digital Circuit Design	ECE 331, 333
ECE 435	Digital Circuit Design Lab	Corequisite ECE 431
ECE 437	Principles of Microelectronic Device Fabrication	ECE 333 or ECE 430
ECE 447	Single-Chip Microcomputer	ECE 332, 445, CS 211
ECE 448	FPGA and ASIC Design with VHDL	ECE 445
ECE 450	Introduction to Robotics	ECE 320, 332, 445
ECE 511	Microprocessors	ECE 445
ECE 546	Parallel Computer Architecture	ECE 445
ECE 548	Sequential Machine Theory	ECE 331
CS 471	Operating Systems	CS 330, 365

CONTROL SYSTEMS

ECE 422	Digital Control Systems	ECE 421
ECE 429	Control Systems Laboratory	Corequisite ECE 422
ECE 447	Single-Chip Microcomputers	ECE 332, 445
ECE 450	Introduction to Robotics	ECE 320, 332, 445
ECE 511	Microprocessors (not if ECE 447 is taken)	ECE 445
ECE 521	Modern Systems Theory	ECE 320
ECE 528	Intro. Random Processes in Elec. & Comp. Engnrg	ECE 220, STAT 346
ECE 549	Theory & App of Artificial Neural Networks	ECE 320

ELECTRONICS

ECE 430	Principles of Semiconductor Devices	ECE 333, 305, MATH 214
ECE 431	Digital Circuit Design	ECE 331, 333
ECE 434	Linear Electronics II Laboratory	ECE 334, Corequisite ECE 433
ECE 435	Digital Circuit Design Lab	Corequisite ECE 431
ECE 437	Principles of Microelectronic Device Fabrication	ECE 333 or 430
ECE 447	Single-Chip Microcomputer	ECE 332, 445
ECE 448	FPGA and ASIC Design with VHDL	ECE 445
ECE 461	Communications Engineering Lab	Corequisite ECE 460
ECE 464	Modern Filter Design	ECE 320
ECE 513	Applied Electromagnetic Theory	ECE 305
ECE 520	Applications of Analog/Digital Integrated Circuits	ECE 431, 433
ECE 563	Introduction to Microwave Engineering	ECE 305
ECE 565	Introduction to Optical Electronics	ECE 305, 333
ECE 567	Optical Fiber Communications	ECE 565
ECE 584	Semiconductor Device Fundamentals	ECE 430
ECE 586	Digital Integrated Circuits	ECE 331, 430
ECE 587	Design of Analog Integrated Circuits	ECE 333, 430

BSEE DEGREE CONCENTRATIONS REQUIREMENTS

Bioengineering, Computer Engineering, Communications/Signal Processing, Control Systems, and Electronics Concentrations are available within the Electrical Engineering Degree Program. Completion of specific courses **and submitting a Change of Major form declaring the Concentration** will lead to one of these designations on the student's transcript upon graduation.

Bioengineering: The new Bioengineering Concentration for EE students focuses on bioinstrumentation. Students will gain familiarity with living systems, and the challenges of taking measurements from such systems. This concentration provides a strong basis upon which to build a variety of careers, such as bioengineering, biomedical engineering, medical electronics or medical school.

Features of the concentration, including differences from the usual EE curriculum include:

a) BIOL 213 (Cell Structure and Function, 4 hours) is substituted for PHYS 262, 263 (4 hours). The substitution is necessary since cell biology is fundamental to bioengineering. Optics, as needed, will be taught in bioinstrumentation.

b) BENG 201 (Introduction to Biomedical Signals) is listed instead of ECE 201. The topics are similar but the BENG designation signifies some biomedical content. Initially, ECE 201 will be accepted as a substitute for BENG 201.

c) BENG 401 (Bioengineering Instrumentation and Design; 4 credits) plus BENG 402 (corresponding laboratory, 1 credit) are substituted for ECE 460 (Communications and Information Technology, 3 credits), and 2 hours of Technical Electives. ECE 433 (Linear Electronics) is a corequisite for BENG 401. BENG 401 and 402 are the defining courses of this concentration.

d) BENG 4xx (BE Advanced Lab, 1 credit) will be created and will be substituted for an ECE Advanced Engineering Lab. The goals and concepts are the same, but the lab will deal with a biomedical application.

e) BENG 492 and 493 (Senior Project; 2 and 2 credits) will be substituted for ECE 492 and 493 (1 and 2 credits). The goals and concepts are the same but project needs to have a biomedical component. The extra hour is to introduce topics (patient safety, FDA) that are of special importance to bioengineers.

f) There are two Technical Electives (6 hours total). These electives need to have some biomedical content. Students are advised, but not required, to consider including BIOL 425 (Human Physiology, 3 credits) as one of the courses.

Typical 8-semester schedule for the Bioengineering Concentration

MATH 113	MATH 114	MATH 213	MATH 214
ENGR 107	ECE 101	MATH 203	**BIOL 213** (4)
CS 112	CS 222	**BENG 201** (3)	ECE 220
ENGL 101	PHYS 160	PHYS 260	ECE 280
ECON 103	PHYS 161	PHYS 261	
	Fine Arts Gen Ed	Literature	
ECE 320	**BENG 401** (4)	**BENG 492** (2)	**BENG 493** (2)
ECE 331	**BENG 402** (1)	ECE 491	**BENG Adv.Lab** (1)
ECE 332	**BENG Tech. Elec**. (3)	**BENG Tech.Elec.** (3)	ECE 421
ECE 333	ECE 433	ECE 305	ECE 445
ECE 334	COMM 100	ENGL 302	HIST 100/125
STAT 346		Global Gen Ed	

Communications/Signal Processing: This concentration is for students who want to develop their knowledge of signal processing and communication systems and engineering. The student will learn the underlying, mathematically based, theory of communication systems and signals, and experience the hardware aspects of communication systems in the lab. Students can develop in-depth knowledge of signal processing, data and digital communication, optical communication, or random processes as related to communication engineering.

Students must complete (with a grade of C or better):

ECE 460, Communications and Information Theory
ECE 461, Communication Engineering Laboratory
ECE 492/493, Senior Advanced Design Project (communications or signal processing topic)
and three courses from the following:
ECE 410, Principles of Discrete-Time Signal Processing
ECE 462, Data and Computer Communications
ECE 463, Digital Communication Systems
ECE 464, Modern Filter Design
ECE 465, Computer Networking Protocols
ECE 499, Special Topics in Electrical Engineering (Must be preapproved by advisor)
ECE 528, Intro. to Random Processes in Electrical and Computer Engineering
ECE 535, Digital signal processing
ECE 567, Optical Fiber Communications
ECE 590, Selected Topics in Elec. and Comp. Engr. (Must be preapproved by advisor)
PHYS 306, Wave Motion and Electromagnetic Radiation

Computer Engineering: This concentration is for students who want to develop their knowledge of computer systems and engineering. The student will learn the varied concepts of computer architectures, design and interfacing, and experience the hardware aspects of microcomputer systems in the lab. Students can develop in-depth knowledge of digital circuit design, computer design and interfacing, microprocessor systems, advanced computer architectures and machine theory, or operating systems.

Students must complete (with a grade of C or better):

ECE 445, Computer Organization
ECE 447, Single-Chip Microcomputers (includes Advanced Lab)
ECE 492/493, Senior Advanced Design Project (computer engineering or digital design topic)
and two courses from the following:
ECE 431, Digital Circuit Design
ECE 437, Prin. of Microelectronic Device Fabrication
ECE 450, Introduction to Robotics
ECE 448, FPGA and ASIC Design with VHDL (included Advanced Lab)
ECE 499, Special Topics in Electrical Engineering (Must be preapproved by advisor)
ECE 548, Sequential Machine Theory
ECE 590, Selected Topics in Elec. and Comp. Engr. (Must be preapproved by advisor)
CS 471, Operating Systems

BSEE DEGREE CONCENTRATIONS REQUIREMENTS

Control Systems: This concentration is for students who want to develop their knowledge of control systems. The student will learn the underlying, mathematically based, theory of control systems, and will experience the hardware aspects of digital control systems in the lab. Students can develop in-depth knowledge of digital control systems, microprocessor control, robotics, linear systems theory, random processes, or neural networks.

Students must complete (with a grade of C or better):

ECE 421, Classical Systems and Control Theory
ECE 429, Control systems Laboratory
ECE 492/493, Senior Advanced Design Project (control systems or robotics topic)
and three courses from the following:
ECE 422, Digital Control Systems
ECE 447, Single-Chip Microcomputers (includes Advanced Lab)
ECE 450, Introduction to Robotics
ECE 499, Special Topics in Electrical Engineering (Must be preapproved by advisor)
ECE 511, Microprocessors (not if ECE 447 is taken)
ECE 521, Modern Systems Theory
ECE 528, Intro. to Random Processes in Electrical and Computer Engineering
ECE 549, Theory and Applications of Artificial Neural Networks
ECE 590, Selected Topics in Elec. and Comp. Engr. (Must be preapproved by advisor)

Electronics: This concentration is for students who want to develop their knowledge of microelectronics or photonics/electromagnetic theory. Students will further their knowledge of linear and digital electronics and experience the hardware aspects of advanced analog or detailed digital circuit design in the lab. Students can develop an in-depth knowledge of device electronics; analog and digital circuit or system design; or advanced photonics/electromagnetic theory.

Students must complete (with a grade of C or better):

ECE 433, Linear Electronics II
ECE 434, Linear Electronics II Laboratory, or
ECE 435, Digital Circuit Design Laboratory
ECE 492/493, Senior Advanced Design Project (analog or digital design, or electromagnetism topic)
and three courses from:
ECE 430, Principles of Semiconductor Devices
ECE 431, Digital Circuit Design
ECE 437, Prin. of Microelectronic Device Fabrication
ECE 447, Single-Chip Microcomputers (includes Advanced Lab)
ECE 448, FPGA and ASIC Design with VHDL (includes Advanced Lab)
ECE 499, Special Topics in Electrical Engineering (Must be preapproved by advisor)
ECE 513, Applied Electromagnetic Theory
ECE 520, Applications of Analog/Digital Integrated Circuits
ECE 563, Introduction to Microwave Engineering
ECE 565, Introduction to Optical Electronics
ECE 567, Optical Fiber Communications
ECE 584, Semiconductor Device Fundamentals
ECE 586, Digital Integrated Circuits
ECE 587, Design of Analog Integrated Circuits
ECE 590, Selected Topics in Elec. and Comp. Engr. (Must be preapproved by advisor)
PHYS 306, Wave Motion and Electromagnetic Radiation
PHYS 308, Modern Physics with Applications

CHANGES to BSEE DEGREE PROGRAM including IMPACT on NOVA STUDENTS

A number of accommodations have been arranged with NOVA to minimize the impact on Northern Virginia Community College (NOVA) students transferring to the EE program at GMU. Changes and notes on their impact on NOVA students:

1. Dropped CHEM 251 = NOVA CHM 126, Chem. for Engrs. Understanding with NOVA that students can substitute PHY 243, Physics III, for this course in the NOVA AS(EE) degree program.

2. Dropped ENGR 210 = NOVA EGR 240, Statics. Understanding with NOVA that students can substitute MTH 285, Linear Algebra, or MTH 291, Diff. Equations for this course in the NOVA AS(EE) degree program.

3. Dropped CS 211 = NOVA CSC 202, Computer Science II.

4. Course, ECE 101, Information Technology for Electrical Engineers, for BSEE program.
   Will be **waived** if transfer courses include NOVA required EGR 251, Electric Circuits I. The 3 credit hours will need to be made up. See Dr. Sutton.

4. Course, ECE 201, Introduction to Signal Analysis.
   May be **waived** if transfer courses include NOVA required EGR 251, Electric Circuits I, **and student agrees to learn intermediate MATLAB usage independently and earns a C or better in ECE 220**. The 3 credit hours of waived ECE 201 will need to be made up. See Dr. Sutton.
   NOVA students choosing to request a waiver of ECE 201 will need to learn MATLAB material usage independently. This is material *beyond* that learned in EGR 251/252/255. See help via web pages referenced on **http://ece.gmu.edu/matlab/matlab.html**, and ECE 306 Experiments 1-6 and 10-11 at **http://ece.gmu.edu/ececourses/ece306/ece306exper.html**.

5. Replaced ECE 285/286 sequence, with ECE 280, Electric Circuit Analysis. Satisfied by NOVA required EGR 251 and EGR 252, Electric Circuits I and II, plus EGR 255, Electric Circuits Lab.

6. Revised ECE 331/332, Digital System Design/Lab, to use sophisticated computer tool, VHDL (VHSIC Hardware Description Language). NOVA EGR 265, Dig. Logic, will not satisfy the BSEE or BSCpE requirement for ECE 331/332. It will transfer as equivalent to ECE 301, Dig. Electronics, which does not satisfy any BSEE or BSCpE requirement.

7. Students transferring to George Mason, having earned an AS degree at NOVA or within the Virginia Community College System, will be considered to have met the General Education requirement of ENGL 101, literature course, HIST 100, Fine Arts course and Global Understanding course. These students will still need to satisfy the BSEE requirement for COMM 100, ECON 103 and ENGL 302 by taking the George Mason courses or equivalent transfer courses. Students transferring to George Mason without having earned an AS degree at NOVA or within the Virginia Community College System will need to meet all the General Education courses required at the time of admission to George Mason.

8. A student with a Bachelor's degree may have satisfied the GMU General Education requirements mentioned in 7, plus ENGL 302. See Dr. Sutton.

9. All students, regardless of any prior AS or BS degree must present 24 credit hours of approved non-technical course work for any degree within The Volgenau School. See Dr. Sutton if you have a question.

BACHELOR of SCIENCE in COMPUTER ENGINEERING

The computer engineering program is accredited by ABET (formerly the Accreditation Board for Engineering and Technology). This computer engineering curriculum incorporates an innovative approach to the integration of the science and engineering components of Electrical Engineering, the abstract mathematical concepts and programming aspects of Computer Science and the humanities and social science requirements of ABET. The major distinction between Computer Engineering and Computer Science is that Computer Engineer is more concerned with the physical implementation of computing devices, the interaction between hardware and software, and the methodologies for designing digital systems.

More specific goals of the program are to provide the graduates with:

- a sound foundation in the basic sciences, mathematics and engineering.
- knowledge and understanding of the fundamentals of digital circuit design and analysis, VLSI design, the underlying device physics, operating system software and programming languages, software interaction with physical devices, as well as computer, computer system, and circuit design using VHDL.
- an emphasis on the real-time aspects of signal and image processing digital signal processing, computer interfacing, VHDL design, and computer networking.
- laboratory experience stressing experimentation and simulation methods to confirm basic principles.
- ability to use computers for design and analysis purposes and familiarity with available software tools.
- design experience in engineering problems by both classroom assignments and active participation in design projects, including team projects.
- the ability to communicate well orally and in writing with both engineering professionals and non-engineering individuals.
- an appreciation of engineering's impact on society and the professional responsibilities of engineers.

The curriculum provides a strong background in the fundamentals of computer engineering. The VHSIC Hardware Description Language (VHDL) is incorporated into the curriculum at all levels. The relatively recent development of hardware description languages provides a design and simulation language for developing all types of discrete systems thereby reducing the dependence on expensive hardware prototyping A number of Technical Elective areas are offered, ranging from strongly hardware oriented to strongly software oriented. A major project with appropriate planning, documentation, and oral and written reports is required.

Career opportunities exist in the areas of basic research, product design, software engineering, project engineering, engineering management, engineering consultancy, technical sales and many others. Graduates of this program will be qualified to assume entry level engineering positions which require a thorough knowledge of digital design principles and practices, the use of hardware description languages, and the interface between software and hardware. They will also be prepared to work on computer network design and the interconnection of multiple computers in a distributed processing environment as well as understand the software which integrates their operation.

Recent George Mason graduates have gone on to graduate work at highly competitive institutions such as MIT, Stanford, Cornell and California Institute of Technology, and as working engineers at high technology companies and government agencies such as BDM, General Electric, Hughes, IBM, INTEL, Lockheed-Martin, MCI, MITRE, NASA, Naval Research Lab and Orbital Sciences.

REQUIRED COURSES SHOWN IN A SAMPLE SCHEDULE
FOR
B.S. IN COMPUTER ENGINEERING

1st Semester	*Lec. Hrs.*	*Lab Hrs.*	*Credits*
MATH 113 Analytic Geometry & Calculus I	4		4
ENGR 107 Engineering Fundamentals	2		2
CS 112 Computer Science I	3	2	4
ENGL 101 English Composition	3		3
ECON 103 MicroEconomics	3		3
			16
2nd Semester			
MATH 114 Calculus II	4		4
MATH 125 Discrete Mathematics	3		3
PHYS 160 University Physics I	3		3
PHYS 161 University Physics I Lab		3	1
CS 211 Computer Science II	3		3
			14
3rd Semester			
MATH 213 Calculus III	3		3
MATH 203 Matrix Algebra	3		3
PHYS 260 University Physics II	3		3
PHYS 261 University Physics II Lab		2	1
ECE 201 Introduction to Signal Analysis	3		3
Literature Course [3]	3		3
			16
4th Semester			
MATH 214 Differential Equations [4]	3		3
ECE 280 Electric Circuit Analysis	4	2	5
ECE 220 Signals and Systems I	3	1	3
ECE 331 Digital System Design	3		3
ECE 332 Digital Systems Design Lab		3	1
			15

[1] GMU requires 45 hours of courses numbered 300 or above to be submitted as part of the required degree program courses when applying for graduation. If you transferred to GMU you may need to take extra course work to meet this requirement. **Note, transfer courses labeled with an "L" in the GMU equivalent course do *not* count towards the 45 hours of "300 level or above" courses.** These transfer courses **do** "count" toward satisfying the specifically required BSCpE courses. See Dr. Sutton if you have any credit hours of "L" labeled transfer courses that you are intending to apply towards the GMU BSCpE degree, to discuss your options.

[2] The Volgenau School requires 24 hours of approved social science and humanities course work. This is normally satisfied by the 24 hours of university general education courses. **All transfer students, even those with associates or bachelors degrees, must also meet this requirement.** This may require taking additional course work to meet this requirement. See Dr. Sutton for approved courses.

[3] Literature courses include (but are not limited to): ENGL 201; Chinese 310, 311, 325, 328 in English); French 325, 329 (in English); German 325 (in English); Russian 325-327 (in English); Spanish 325 (in English); Foreign Languages 330 (in English); CLAS 250, 260, 340, 350, 360, 380; and PHIL 253. The ECE Department will announce additional approved literature courses as they become available.

[4] Students are strongly encouraged to try to plan a math sequence that will allow taking MATH 214, Differential Equations, *prior* to ECE 220. I.e. Summer classes, AP credits.

5th Semester	*Lec. Hrs.*	*Lab Hrs.*	*Credits*
ECE 333 Linear Electronics I	3		3
ECE 334 Linear Electronics I Lab		3	1
CS 262 Introduction to Low Level Programming	1		1
ECE 445 Computer Organization	3		3
STAT 346 Probability for Engineers	3		3
ENGL 302 Advanced Composition (For Nat. Sci. and/or Tech.)	3		3
			14
6th Semester			
CS 367, Computer Systems and Programming	3		3
CS 471 Operating Systems	3		3
ECE 465 Computer Networking Protocols	3		3
COMM 100 Introduction to Oral Communication	3		3
PHYS 262 University Physics III	3		3
			15
7th Semester			
ECE 447 Single Chip Microcomputer	3	3	4
Technical Elective [5]	3		3
HIST 100 History of Western Civilization			
or HIST 125, Introduction to World History	3		3
ECE 491 Engineering Senior Seminar	1		1
ECE 492 Senior Advanced Design Project I	1		1
Global Understanding General Education Elective [6]	3		3
			15
8th Semester			
ECE 448 FPGA and ASIC Design with VHDL	3	3	4
ECE 493 Senior Advanced Design Project II	2		2
Technical Elective [5]	3		3
Technical Elective [5]	3		3
Fine Arts General Education Elective [6]	3		3
			15

[5] The Technical Electives requirement is satisfied by a student selecting one of the *pre-approved* technical electives courses listings. (See page 15). A student may, with the prior approval of the Computer Engineering Advisor or Department Associate Chair, create an individualized technical courses listing by selecting a coherent sequence of three Technical Electives from the list of Technical Elective Courses (page 14). This plan will be filed in the student's Departmental file.

[6] The Global Understanding elective and the Fine Arts elective should be selected from the Department's lists of approved courses. See list of Approved Global Understanding Electives on pages 20 - 21. See list of Approved Fine Arts Electives on page 22.

[7] The General Education Synthesis requirement is met by satisfactory completion of ECE 492/492.

[8] No C- or D grades in ECE, ENGR or CS courses can be submitted for the BSCpE degree.

COMPUTER ENGINEERING TECHNICAL ELECTIVES

Course		*(Credits:Lect.Hrs.:Lab Hrs.)*
ECE 320	Signals and Systems II	(3:3:0)
ECE 410	Principles of Discrete-Time Signal Processing	(3:3:0)
ECE 430	Principles of Semiconductor Devices	(3:3:0)
ECE 431	Digital Circuit Design	(3:3:0)
ECE 433	Linear Electronics II	(3:3:0)
ECE 437	Principles of Microelectronic Device Fabrication	(3:3:0)
ECE 450	Introduction to Robotics	(3:3:0)
ECE 460	Communications and Information Theory	(3:3:0)
ECE 462	Data and Computer Communications	(3:3:0)
ECE 499	Special Topics in Electrical Engineering (Requires prior Advisor's approval)	(3:3:0)
ECE 528	Intro to Random Processes in ECE	(3:3:0)
ECE 548	Sequential Machine Theory	(3:3:0)
ECE 586	Digital Integrated Circuits	(3:3:0)
ECE 590	Selected Topics in Engineering (Requires prior Advisor's approval)	(3:3:0)
CS 451	Computer Graphics and Software Design	(3:3:0)
CS 480	Introduction to Artificial Intelligence	(3:3:0)
CS 490	Design Exhibition	(3:3:0)
TCOM 505	Networked Multicomputer Systems *plus*	
TCOM 510	Client-Server Architectures and Applications	(1.5:1.5:0)+(1.5:1.5:0)

COMPUTER ENGINEERING PRE-APPROVED TECHNICAL ELECTIVE TECHNICAL AREAS COURSES LISTINGS

COMPUTER NETWORKS

Course		*Prerequisites*
ECE 460	Communication and Information Theory	ECE 220, STAT 346
ECE 462	Data and Computer Communications	ECE 220, STAT 346
TCOM 505	Networked Multi-Computer Systems plus TCOM 510 Client/Server Architectures and Applications	ECE 465

SIGNAL PROCESSING

Course		*Prerequisites*
ECE 320	Signals and Systems II	ECE 220
ECE 460	Communications and Information Theory	ECE 220, STAT 346
ECE 410	Principles of Discrete-Time Signal Processing	ECE 320, STAT 346
or ECE 464	Modern Filter Design	ECE 320

INTEGRATED CIRCUITS

Course		*Prerequisites*
ECE 431	Digital Circuit Design	ECE 331, 333
ECE 433	Linear Electronics II	ECE 333
ECE 437	Principles of Microelectronic Device Fabrication	ECE 333 or ECE 430

CHANGES to BSCpE DEGREE PROGRAMS and IMPACT on NOVA STUDENTS

A number of accommodations have been arranged with Northern Virginia Community College (NOVA) to minimize the impact on NOVA students transferring to the CpE program at GMU. Changes and their impact on NOVA students:

1. Dropped CHEM 251 = NOVA CHM 126, Chem. for Engrs. Understanding with NOVA that students can substitute PHY 243, Physics III, for this course in the NOVA AS(EE) degree program.

2. Dropped ENGR 210 = NOVA EGR 240, Statics. Understanding with NOVA that students can substitute MTH 285, Linear Algebra, or MTH 291, Diff. Equations for this course in the NOVA AS(EE) degree program.

3. Course, ECE 201, Introduction to Signal Analysis.
   May be **waived** if transfer courses include NOVA required EGR 251, Electric Circuits I, **and student agrees to learn intermediate MATLAB usage independently and earns a C or better in ECE 220**. The 3 credit hours of waived ECE 201 will need to be made up. See Dr. Sutton.
   NOVA students choosing to request a waiver of ECE 201 will need to learn MATLAB material usage independently. This is material *beyond* that learned in EGR 251/252/255. See help via web pages referenced on **http://ece.gmu.edu/matlab/matlab.html**, and ECE 306 Experiments 1-6 and 10-11 at **http://ece.gmu.edu/ececourses/ece306/ece306exper.html**.

4. Replaced ECE 285/286 sequence with ECE 280, Electric Circuit Analysis. Satisfied by NOVA required EGR 251 plus EGR 252, Electric Circuits I and II, plus EGR 255, Electric Circuits Lab.

5. Revised ECE 331/332, Digital System Design/Lab, to use sophisticated computer tool, VHDL (VHSIC Hardware Description Language). NOVA EGR 265, Digital Logic, will not satisfy the BSEE or BSCpE requirement for ECE 331/332. It will transfer as equivalent to ECE 301, Digital Electronics, which does not satisfy any BSEE or BSCpE requirement.

6. Dropped CS 265 = NOVA CSC 206, Assembly Language.

7. Students transferring to George Mason, having earned an AS degree at NOVA or within the Virginia Community College System, will be considered to have met the General Education requirement of ENGL 101, literature course, HIST 100, Fine Arts course and Global Understanding course. (See Sample Schedule semesters 1, 3, 5, 7 and 8.) These students will still need to satisfy the BSCpE requirement for COMM 100, ECON 103 and ENGL 302 by taking the George Mason courses or equivalent transfer courses. Students transferring to George Mason without having earned an AS degree at NOVA or within the Virginia Community College System will need to meet all the General Education courses required at the time of admission to George Mason.

8. A student with a Bachelor's degree may have satisfied the GMU General Education requirements mentioned in 7, plus ENGL 302. See Dr. Sutton.

9. All students, regardless of any prior AS or BS degree must present 24 credit hours of approved non-technical course work for any degree within The Volgenau School. See Dr. Sutton if you have a question.

ACCELERATED MS/BS (MASTERS/BACHELORS) PROGRAM

The accelerated MS/BS program is intended for those highly capable students who are interested in immediately continuing their undergraduate academic program in electrical or computer engineering into a graduate program in their respective discipline. This program allows for the completion of both a Bachelor's degree and a Master's degree in five years, in 144 credit hours.

Admission

1. Students in the electrical engineering program or computer engineering program should apply for the accelerated MS/BS program in EE or CpE, during the semester in which they expect to complete 90 undergraduate credits applicable toward the BS degree, but no later than their next-to-last semester.

2. An overall GPA of at least 3.50 at the time of application is required.

3. Criteria for admission to the accelerated MS/BS program in EE or CpE is identical to the criteria for admission to the MS EE or MS CpE programs.

4. Application is made using an Accelerated Program application form specifying the up to 6 hours of graduate courses to be applied to the undergraduate degree and detailing the 3.50 undergraduate GPA required for approval.

Degree Requirements

1. Students must complete at least 144 credit hours that satisfy all the requirements for both the BS degree and the MS degree.

2. Students will take up to 6 credit hours of 500 level courses either as part of their technical electives or substituting for required courses as part of their 120 credit hour undergraduate program. Students taking 6 credit hours will need to submit 24 credit hours of approved graduate work to earn the MS degree. Students taking 3 credit hours will need to submit 27 credit hours for the MS degree. The specific graduate courses that may be taken as part of the accelerated program and applied to the undergraduate degree will be specified by the ECE Department, for the EE program and for the CpE program.

3. Students in the accelerated MS/BS program may request to take additional graduate level courses (beyond the six hours described above) as technical electives, as part of the 120 credit hours required for the BS degree. These additional graduate level courses will be considered part of the 120 credit hour BS degree and will not count toward the MS degree. Students will still need to complete 24 or 27 credit hours beyond the 120 hour BS degree in order to earn the MS degree.

4. Students admitted to the accelerated program must maintain an overall GPA of at least 3.50 during their entire MS/BS program, and must present a GPA of at least 3.50 for all credit hours of graduate work submitted for the MS degree.

Degree Conferral

1. Students in the accelerated MS/BS program may apply to have the BS (in EE or CpE) conferred during the semester in which they expect to complete the BS requirements.

2. At the completion of the MS requirements the MS degree will be awarded.

DOUBLE MAJORS

Double Majors are possible for students who want a stronger or broader academic background. Combinations of majors that have been completed recently include: EE/Physics, EE/Math, CpE/Computer Science, CpE/EE, EE/Computer Science. Completion of a Double Major requires that all the requirements of both majors be satisfied. Since the engineering programs are very structured with minimal flexibility, a student is strongly advised to start work on the Double Major early by researching the requirements of both majors and talking to advisors for both majors. Sample Schedules for CpE/CS and EE/CpE double majors are available in the ECE Department. George Mason requires that at least 18 hours of courses *different from (in addition to) those submitted as part of the 120 hours needed to earn the BS degree with the first major or those submitted for a minor* must be presented in order to be awarded the second major as part of the BS degree.

MINORS IN BUSINESS, COMPUTER SCIENCE, MATH, PHYSICS AND INFORMATION TECHNOLOGY (IT)

Information Technology Minor: The IT Minor is not open to CpE or EE students.

Computer Science (CS) Minor: The CS Minor is open to EE and CpE students The CS Minor is suggested for Electrical Engineering students who want to increase their knowledge of the computer science discipline. The requirements of the Minor are:

Course	Credits	Title
CS 105 or 306	1(3)	Computer Ethics
CS 112	4	Introduction to Computer Programming
CS 211	3	Object Oriented Programming
CS 310	3	Data Structures
CS xxx	6	Two courses from CS 330, 332, 363, 367, 421, 450, 451, 455, 468, 480, 483 and 484

At least 6 hours of the Minor must be completed at GMU, and no more than 3 hours of D's in the Minor is accepted. George Mason requires that at least 8 hours of courses *different from (in addition to) those submitted as part of the 120 hours needed to earn the BS degree or submitted for another minor* must be presented in order to be awarded the Minor.

Physics Minor: This Minor is open to CpE and EE students. The Physics Minor is suggested for those students who want to increase their knowledge of physics as it applies to computer or electrical engineering. The requirements of the Minor are:

Course	Credits	Title
PHYS 160/161	3/1	University Physics I/Physics I Lab
PHYS 260/261	3/1	University Physics II/Physics II Lab
PHYS 262/263	3/1	University Physics III/Physics III Lab
PHYS xxx	6	Two courses from PHYS 303, 306, 307, 308, 402, 428 and 513 or ECE/PHYS 305.

(Underlined courses are either required, or may be approved as electives, for the BSEE or BSCpE. Check with your advisor.)

At least 6 hours of the Minor must be completed at GMU, and no more than 3 hours of D's in the Minor is accepted. George Mason requires that at least 8 hours of courses *different from (in addition to) those submitted as part of the 120 hours needed to earn the BS degree or submitted for another minor* must be presented in order to be awarded the Minor.

Math Minor: This Minor is open to CpE and EE students. The Math Minor is suggested for those students who want to increase their knowledge of basic and theoretical math which can be applied to computer or electrical engineering. The Math Minor consists of the following 21 credits of math courses:

1. MATH 125, Discrete Math I
2. MATH 203, Matrix Algebra
3. MATH 213, Calculus III
4. MATH 214 or 216, Differential Equations
5. MATH 290, Foundations of Math, with a grade of C or better
6. One of the following with a grade of C or better
   MATH 315, Advanced Calculus I, or
   MATH 321, Abstract Algebra, or
   MATH 322, Linear Algebra
7. Any additional three credit math course numbered above 300 or STAT 346/344.

The heart of the minor is the inclusion of Math 290 together with a course for which it is a prerequisite (MATH 315 or 321 or 322). These courses are more rigorous than any of the others on the list and so might provide a bit of challenge for a nonmath major.

EE and CpE majors will have satisfied requirements, 1, 2, 3, 4 and 7. They would need to satisfy requirements 5, MATH 290, and 6, one of MATH 315, 321, 322. However, George Mason requires that at least 8 hours of courses *different from (in addition to) those submitted as part of the 120 hours needed to earn the BS degree or submitted for another minor* must be presented in order to be awarded the Minor.
At least 6 hours of the Minor must be completed at GMU, and no more than 3 hours of D's in the Minor is accepted.

Business Minor: This Minor is open to CpE and EE students. The Business Minor is suggested for those students who want to increase their knowledge of processes and techniques used in the business world. The Business Minor consists of the following 15 credits of courses:

Course	Credits	Title
MSOM 300	3	Managing Financial Resources
MSOM 301	3	Managing People and Organizations
MSOM 302	3	Managing Information in a Global Economy
MSOM 303	3	Marketing in a Global Economy

One of the following courses:

MSOM 304	3	Entrepreneurship: Starting and Managing a New Enterprise
MSOM 305	3	Managing in a Global Economy
		(also satisfies Global Understanding General Education requirement)
MSOM 306	3	Managing Projects and Operations

A grade of C or better is required in all courses presented on the application for the Minor. At least 6 hours of the Minor must be completed at GMU.

APPROVED GLOBAL UNDERSTANDING
GENERAL EDUCATION ELECTIVES for CpE and EE PROGRAMS

No graduate level courses are approved.

Discipline	*Approved Courses*
ANTH 302	Peoples and Cultures Of Latin America
ANTH 304	Peoples and Cultures of the Pacific
ANTH 306	Peoples and Cultures of Island Asia
ANTH 309	Peoples and Cultures Of India
ANTH 311	Peoples and Cultures of Mainland Southeast Asia
ANTH 312	Comparative Political Systems
ANTH 332	Cultures in Comparative Perspective
ANTH 385	Gender, Class, and Ethnicity in Latin America
ARTH 203	Survey of Asian Art
ARTH 319	Art of the Ancient Near East
ARTH 320	Art of the Islamic World
ARTH 380	African Art
ARTH 382	Arts of India
ARTH 383	Arts of Southeast Asia
ARTH 384	Arts of China
ARTH 385	Arts of Japan
COMM 305	Foundations of Intercultural Communication
DANC 318	Global Perspectives: World Dance Forms
ECON 360	Economics of Developing Areas
ECON 361	Economic Development of Latin America
ECON 362	African Economic Development
ECON 380	Economies in Transition
ECON 390	International Economics
ENGL 349	Global Voices
GEOG 101	Major World Regions
GLOA 101	Introduction to Global Affairs
GOVT 132	Introduction to International Politics
GOVT 133	Introduction to Comparative Politics

APPROVED GLOBAL UNDERSTANDING
GENERAL EDUCATION ELECTIVES for CpE and EE PROGRAMS

No graduate level courses are approved.

Discipline	*Approved Courses*
HIST 130	Modern Global Systems
HIST 251	Survey of East Asian History
HIST 252	Modern East Asia
HIST 262	Survey of African Civilizations to the 1600's to Present
HIST 272	Latin America in the Modern Era
HIST 282	Survey of Middle Eastern Civilizations
HIST 329	Modern Russia and the Soviet Union
HIST 356	Modern Japan
HIST 364	Revolution and Radical Politics in Latin America
HIST 460	State and Society in Modern Iran
HIST 462	Women in Islamic Society
MSOM 305	Managing in a Global Economy
MUSI 103	Musics of the World
MUSI 431	Music History in Society III
RELI 100	Human Religious Experience
RELI 211	Religions of the Near East
RELI 212	Religions of the Orient
RELI 313	Hindu Philosophy & Religion
RELI 315	The Buddhist Tradition
RELI 374	Islamic Thought
RUSS 354	Contemporary Post-Soviet Life
SOCI 120	Problems in Global Society
SOCI 332	Sociology of Urban Communities
SPAN 322	Introduction to Latin American Culture
WMST 100	Representation of Women

APPROVED FINE ARTS GENERAL EDUCATION ELECTIVES
for CpE and EE PROGRAMS

No graduate level courses are approved.

Discipline	*Approved Courses*
ARTH 102	Symbols and Stories in Art
ARTH 200	Survey of Western Art (1)
ARTH 201	Survey of Western Art (2)
ARTH 321	Greek Art and Archaeology
ARTH 322	Roman Art and Archeology
ARTH 324	From Alexander the Great to Cleopatra: The Hellenistic World
ARTH 333	Early Christian and Byzantine Art
ARTH 334	Western Medieval Art
ARTH 341	Northern Renaissance Art
ARTH 342	High Renaissance Art in Italy, 1480-1570
ARTH 344	Baroque Art in Italy, France and Spain
ARTH 360	Nineteenth-Century European Art
ARTH 362	Twentieth-Century European Art
ARTH 372	Studies in 18th and 19th Century American Art
ARTH 373	Studies in 20th Century American Art
DANC 101	Dance Appreciation
ENGL 332	Introduction to Film
MUSI 101	Introduction to Classical Music
MUSI 102	Popular Music in America
MUSI 107	The Development of Jazz
MUSI 302	American Musical Theater
THR 101	The Theatrical Medium
THR 150	Drama, Stage and Society I
THR 151	Drama, Stage and Society II

APPROVED SUBSTITUTES AND WAIVERS for CpE and EE PROGRAMS

Required	Substitute
PHYS 261 (1)	PHYS 265 (2)
CS 211 (for EEs)	CS 222
CS 367 (for EEs)	CS 222
CS 310 (for CpEs)	CS 367
ECE 101	**Waived** if transferring: (1) a specific *Introduction to* , or *Fundamentals of, Engineering* course, and (2) Calculus II or a calculus based Physics I course, and (3) more than 24 hours applicable to the GMU BSEE degree. A 3 credit hour approved math, science, CS, SYST or ECE course may be required to replace the 3 credit hours of ECE 101 if appropriate transfer credits are not presented. See Dr. Sutton.
ECE 201	**Waived** if (1) transferring a course equivalent to ECE 285, Circuit Analysis I, and (2) student demonstrates knowledge of MATLAB by completing ECE 220 with a C or better in the first "taking". A 3 credit hour approved ECE, SYST or CS course may be required to replace the 3 credit hours of ECE 201 if appropriate transfer credits are not presented. See Dr. Sutton.
ECE 280	ECE 285, Circuit Analysis I, plus ECE 286, Circuit Analysis II, plus demonstrated knowledge of SPICE.
HIST 100	Satisfied by a European History transfer course if student is a transfer student with at least 60 hours of transfer courses and course is taken before enrolling in George Mason.

Read this Brochure (cover to cover) and the GMU Catalog

TIPS-N-HINTS

ACADEMIC STATUS

Important! Starting in Fall 2007 George Mason has changed the way it determines successful or "problem" academic performance. For details go to the Registrar's web site or link directly via: http://registrar.gmu.edu/students/standing/academicstanding.html. Basically the new process relies only on the cumulative GPA and the number of credit hours (GMU attempted, transfer, AP, credit by exam) a student has on their GMU record. Having a **cumulative** GPA less than a 2.000 results in an Academic Status designation ranging from Warning to Suspension, depending on the student's Credit Level. Credit Level now also includes credit hours of the "original" course as well as the "repeat" course when a student repeats a specific course. The Cumulative GPA is still determined only by the credit hours and grade of the most recent course. Students are responsible for being aware of their Credit Hour Level and the corresponding GPAs for Warning, Probation and Suspension.

REPEATING A COURSE

Starting in Fall 2004 George Mason allows undergraduate students to repeat (almost) *any* course for a new grade. Upon completion of the repeated course the *old* grade will be "flagged" as "not included in cumulative GPA", but will remain on the transcript. The *new* grade will become part of the cumulative GPA, *even if it is lower than the previous grade*! This Repeat policy can help a student increase their GPA, particularly if a low GPA was due to D or F grades. **Important!** Note the revised calculation of Credit Level described above in ACADEMIC STATUS.

GENERAL, GOOD, STUFF

Listen to friends, believe faculty.

Math is vital: get understanding, not merely grades.

Plan on spending about three hours of time "studying" for each hour of time you spend in a "technical" class (math, physics, computer science, engineering). To succeed in engineering courses you MUST do assigned homework (as a minimum!). This means putting pencil to paper and writing out the total problem solution, not merely looking at the problem and thinking "I know how to do that one." "Reading" the textbook is not "studying".

Most faculty only *assign* enough homework to "acquaint" you with the types of material you must know and understand, not necessarily enough homework for you to "master" the material. Hence, you should do more problems than are assigned. Use study groups to get support with doing extra problems.

Do course homework *just as you have to do an in-class exam* for that course. If the class exams are "closed book" then, when you do your homework, you need to turn to the problems and do them. If you find you need to refer to the text or your notes for examples or equations, then you do not know the material well enough to do the homework. Go back and study more. If the class exam allows an "equations sheet" then, as you study, prepare the sheet. When you do your homework you will turn to the problems and do them referring only to your "equation sheet".

Again, if you need to refer back to the text or notes, you do not know the material well enough to be doing the homework. Study more.

Take Probability (STAT 346) just before ECE 410, ECE 460 or ECE 542 (whichever you do first.) These are the courses that use probability. If you take the math too early you will not have the facility with it that is needed for success in them.

Take ECE 491, Senior Seminar, during the semester **just prior to your graduation semester**. Among the many topics discussed, are Resume, Cover Letter and Interviewing preparation. By taking the course at this time you will be prepared to participate in the Job Fairs and On Campus Interviewing during those important last two semesters of your degree program.

If you are interested in computer engineering or the computer area of electrical engineering and think you **might** do a Senior Design Project that involves microcontrollers (many, many students do!), then you need to plan on taking ECE 447, Single Chip Microcomputers, **the semester before** taking ECE 492, Senior Design Project I, or **the same semester** as ECE 492. It is hard to have to learn microcontroller technology **while** you are implementing on your Senior Design Project. Note ECE 447 is only offered during the Fall semesters and has "a C or better in ECE 445" as a **prerequisite**, and ECE 445 has "a C or better in ECE 331 and ECE 332" as **prerequisites**!

The lab course associated with a lecture/lab courses pair may be taken *after* taking the lecture course **except for ECE 331 and ECE 332 which must be taken together**. This allowed "lab after lecture" includes Physics lecture/lab pairs.

Do not take ENGL 302 until **after** completing ECE 280 and ECE 331. In ENGL 302 you will learn to write and critique writing "in the technology" of your major. Completing the above courses will allow you to read basic electrical or computer engineering technical journal articles.

Try to delay taking COMM 100 until just before ECE 492 or at the same time as ECE 492. You do not use public speaking much in your other courses. It is good to get the public speaking tips and experience just when you *will* need it: in ECE 492 and ECE 493.

Plan on checking the ECE Department Bulletin Board regularly. Notices of changes in class offerings and locations, jobs, Off-sITE visits, changes in degree requirements, student organizations events, and much other useful information is available.

ADVISING and The IMPORTANT ADVISOR

Toward the end of September or February of your first semester at George Mason, an advisor from the ECE Department will be assigned. This assignment is shown in the listing on the bulletin board across from the Department office (room 3100, Engineering Building). Advisors have office hours during which you may just walk-in for advising. Office hours each semester, phone and office numbers, and email addresses are posted on the bulletin boards across from the Department office. If your classes or work conflict with posted office hours, phone or email your advisor or leave a note explaining your needs in your advisor's box in the ECE Department office, and special appointment times can be arranged. If for any reason you have a problem with your advisor, please let us know in the Department office and we will help you. You are required to see your advisor prior to registration each semester that you are in ECE. Be sure to get with your advisor early. Do not wait until the last minute as your professor may not be on campus on your registration date.

Your advisor is important in two ways. First, your advisor can keep you informed of changes to the curriculum, of potential problems with *when* you take particular courses, and of other resources to help you in your present academic program and in your subsequent masters degree program. Second, unless you are independently wealthy, you will go to work or go to graduate school when you finish your BS. You will need either references for jobs or recommendations for admissions to graduate school. If you work closely with your advisor you could get a very strong, personal, recommendation, one that an instructor who you had not interacted with one-on-one over a number of years could not provide.

STUDY GROUPS

Very useful for technical courses (Math, Physics, CS, ECE) "survival". Three to five students who want to assist each other in one or more classes. "Psychologically" helpful. Helps a student realize others also find material difficult. "Academically" helpful. The Group can do extra problems and compare answers. Group members *learn by teaching* other members or *being assisted* by other group members. Group members can go "as a group" to instructor for course help. "Study Groups" is not "Group Studying". It is focused, group interactive, learning. (I.e. do not sit around a table with your notes and books and "study".)

COOPERATIVE EDUCATION and INTERNSHIPS

While all degree requirements must be satisfied by academic course work, recruiters are strongly and positively influenced by co-op or internship experiences. Students should plan on obtaining this experience. Cooperative Education, coordinated by the Career Services Office at GMU, provides students with the opportunity to integrate paid, career-related work experience with classroom learning. The Career Services Office co-op liaison visits sophomore and junior ECE classes to discuss co-op. Internships are paid (normally) or non-paid (unusual in technical positions) work experience related to the student's major. I.e. working in a "junior" electrical or computer engineering position in industry. The Career Services Office is an excellent source of internship listings.

SCHOLARSHIPS and FINANCIAL AID

In addition to the usual financial aid available to all students through the Office of Student Financial Planning and Resources, CpE and EE majors are eligible to apply at the ECE Department for several scholarships provided by professional societies and industrial organizations, such as the Armed Forces Communications and Electronics Association, the Association of Old Crows and the Institute of Electrical and Electronic Engineers. Application forms are available in the ECE Department Office in April each year. Students may also apply for the TOP HATS (TOP High Achieving Technical Students) Scholarship/Internship program through The Volgenau School Dean's Office.

REGISTRATION

You will be required to register before each semester. Be on the lookout for when the schedule of classes is posted on the PatriotWeb site in October and February, and see your advisor as soon as possible. Do not wait until the week before you register, you may not be able to contact your advisor in time. This will delay your registration and hence you may not get into the

courses/sections you want. Take advantage of registering as soon as possible after your assigned registration time in order to get maximum advantage from your "priority" which is based on completed and in-process courses. It is **your** responsibility to check (i.e. a day or two after your "request") to make sure you are enrolled in all the courses you want and no courses that you do not want.

WARNING/SUSPENSION CREDIT HOUR LIMIT

All students in a Warning Status (from having designated Credit (hours) Levels and designated cumulative GPA ranges) and all students returning from Suspension are limited to no more than 13 credit hours. **Be careful, any IN grade counts like an "F" for this calculation!**
This GMU policy will be implemented by the Registrar 2 weeks before the first day of classes of each semester by automatically dropping the last course a student enrolled in to try to drop the total hours down to 13. If necessary, additional "last course enrolled in" courses will be dropped. The automatic process does not look for 1 credit courses, it just looks at the date/time a class was enrolled in. Thus it is possible that the automatic drop could drop a student below 12 hours and trigger a potential financial aid, visa, insurance, etc, problem. I.e. if such a student is enrolled for 14 hours (ECE 331[3], ECE 332[1], ECE 333[3], ECE 334[1], STAT 344[3] and ECE 320[3]) and the last course they enrolled in was ECE 320, the automatic drop would drop ECE 320[3], bringing the student down to 11 hours. Once a course is dropped the student loses all "rights" to the course. Other students can add and cause the course to close and the student who was dropped will not get back in.

FORCE ADD/COURSE PERMIT/OVERRIDE

When a class is full/closed you may ask if it is possible to be added above the limit by using a "force add" (Course Permit or "Capacity" Override) option. Under certain exceptional circumstances the instructor can allow additional students into the class by force adding them. This can be done prior to, or at, the first meeting of the class. The instructor may allow you in at that time if it is possible. The instructor will have (or can get) the needed "Course Permit" form or a "Capacity" Override may be placed in your PatriotWeb registration site. The action may require the Chair's approval also.

CLOSED CLASS

Class sizes are determined primarily by academic considerations, and also by the room size limit. Whenever a class(section) has been enrolled to the maximum, it becomes a closed class(section). The ECE Department and many other departments also maintain "wait lists" for selected closed classes. If you find a section is closed, be sure to check for the existence of a Waitlist or use appropriate course/section search options to see if other "unpublished", open, sections might exist, or check with the department offering the course for possible actions. See http://registrar.gmu.edu/patriotweb.html for details on working with Waitlists. In some cases it may be possible to add a student above the limit by using the "force add" option, but this is an exceptional action.

OVERLOAD

If you wish to take more than 18 hours, it is considered an OVERLOAD. You will have to obtain permission from the Dean's office. Pick up the forms and instructions at room 2501, Engineering Building, the office of the Associate Dean for Undergraduate Studies.

DROPPING A COURSE

If you want to drop a course you can only do so within the *first 5 weeks* of the Fall and Spring semesters. If you do so, it will not appear on your transcript. It is **your** responsibility to check (i.e. next day) and make sure any "dropped" course is actually "dropped" by the GMU computer system. After the 5th week, you can not "drop" a course, you may petition through the IT&E Dean's office to "withdraw" from courses. Academic reasons ("I'm not doing well." "I did not have the prerequisites." etc.) can not be submitted as reasons for withdrawal. Pick up the forms and instructions at room 2501, Engineering Building, the office of the Associate Dean for Undergraduate Studies. However, see "Elective Withdrawal for Undergraduates" item next.

ELECTIVE WITHDRAWAL FOR UNDERGRADUATES

Starting in Fall 2005, undergraduates enrolled in degree programs are eligible to withdraw from a limited number of classes without dean's approval and at the student's own discretion. Students may process a maximum of three such elective withdrawals during their entire undergraduate career at Mason. The Withdrawal period for Fall or Spring is from the last day to drop a class through the ninth week - proportionally shorter for shorter Summer sessions. Procedures are published in the semesterly Schedule of Classes.

COURSES AT OTHER UNIVERSITIES

If you need to take a course away from George Mason (i.e. summers if you live elsewhere; if your work or other commitments conflict with a needed course) you need special permission from the Dean's office before registering at the other school or the course will not be allowed as a transfer course. Pick up the forms and instructions at room 2501. Engineering Bulding, the office of the Associate Dean for Undergraduate Studies.

TRANSFER COURSES EQUIVALENCIES

If you feel your transfer evaluation sheet does not indicate that you have received transfer credit for courses that would be applicable to the your EE or CpE degree program, or if only "elective" credit is shown for a course you feel meets a specific degree requirement, then you should contact Dr. Sutton in the Department office.

ENGLISH EXEMPTION

It is possible to "test out" of ENGL 101 or ENGL 302. For ENGL 101 there is a free three hour Proficiency Exam given in the summer and in January. A passing score earns three hours of credit (no grade) for ENGL 101. For ENGL 302 there is a two part process. The first part (permitted after you have completed 45 hours of academic course work) is submission of a

portfolio of long and short written works. This is evaluated and if approved, the second part, a two hour written exam, is scheduled. Satisfactory completion of both parts of the process earns 3 hours of credit (no grade) for ENGL 302. See the English Department (Robinson A487) if you wish to pursue either of these opportunities.

HONOR SOCIETIES

Students should strive for academic excellence which can lead to selection for membership in Eta Kappa Nu (HKN), the National Honor Society for Electrical and Computer Engineering and/or Tau Beta Epsilon (TBE), the Engineering Honor Society of the School of Information Technology and Engineering. (TBE is the GMU "colony" chapter of Tau Beta Pi, the National Engineering Honor Society). HKN requires that a student is an electrical or computer engineering major and is in the top 1/3rd of the Senior electrical/computer engineering class or the top 1/4th of the Junior electrical/computer engineering class. TBE requires that a student is in an Engineering degree program and is in the top 1/5th of the Senior Engineering class or the top 1/8th of the Junior Engineering class. Honor society members participate in activities and are recognized by unique stoles worn at gradation and mention in the School of Information Technology and Engineering Convocation program.

For Junior status, a CpE Major must have completed ECE 220, ECE 280 and ECE 331, and have completed or be enrolled in ECE 333 and ECE 445, and have 60 hours or less remaining to complete the degree. An EE Major must have completed ECE 220 and ECE 280 and have completed or be enrolled in ECE 331, ECE 333 and ECE 320, and have 60 hours or less remaining to complete the degree to be in Junior status.

For Senior status the student must have 30 hours or less remaining to complete the degree.

ANNUAL ACADEMIC AWARDS

Outstanding academic performance is recognized at graduation via the highest award, the *Distinguished Achievement Award,* as well as the *Outstanding Academic Performance Award,* and several *Chairman's Awards*. Service to the ECE Department, student organizations or The Volgenau School of Information Technology and Engineering by a student with a notable academic record is recognized by the *Joseph I. Gurfein Service Award*. All awardees receive appropriate recognition and are added to the ECE Department plaques.

STUDENT ORGANIZATIONS: Teaming/Communications/Networking

Participation in student organizations can yield valuable results in three areas. One very important capability recruiters look for, but is difficult to develop in regular academic classes is *teamwork* and leadership. Student organizations provide a means to develop and demonstrate the ability to work in teams/groups, to develop leadership ability and to develop communication (oral presentation and written) skills. A second important skill for engineers is the ability to communicate, including speaking to large groups. Again, this is not often a part of regular classes. Participating in student organization activities gives you the opportunity to learn and practice speaking skills. A final advantage to student organization participation is "networking". Networking is "interacting with others in your discipline". In student organizations you will connect to students from freshman level to "about to graduate". You can take advantage of these students knowledge to assist in your academic program - good electives to take, when to take them. But even more important you can connect with students as they graduate from George

Mason. As graduates, in industry, they know where good jobs are. You can get email addresses from them just before they graduate and then easily keep in touch with them Connections with just three to four graduates per year for three years means you know a dozen people in many companies by the time you are looking for your first job. These are people who know you, who know the George Mason engineering curricula, who know your capabilities and most likely want to help you.

Technically related student organizations open to students include student chapters of: the Institute of Electrical and Electronic Engineers (IEEE), the Armed Forces Communications-Electronics Association (AFCEA), the National Society of Professional Engineers (NSPE), the Association of Computing Machinery (ACM), the Society of Women Engineers (SWE), the National Society of Black Engineers (NSBE), the Society of Hispanic Professional Engineers (SHPE). *All* these organizations are open to *any* and *all* students who want to join.

GRADUATION

During your **next to last** semester you will receive notice from the GMU Registrar - Graduation Section to initiate your graduation process by filling out a web-based, on-line, form. Following this you need to come to the ECE Department office to pick up the rest of your graduation application material and a Graduation Checklist.

In order to obtain proper graduation application material you must go to Student Records (North Chesapeake Module, behind Fenwick Library) and file for a change of Catalog year ASAP but no later than the semester **before** your graduation semester if you intend to use any Catalog requirements other than the ones that existed at the time you entered GMU. You are allowed to use any set of requirements that are printed in any one Catalog that comes into existence during your first semester at GMU or later. You can see a "Degree Evaluation" by accessing your records from the GMU homepage (follow the "Students" and then the "Patriot Web" or "Academics <Semester Year>") links) using your Web browser. Check early and often. **Don't get caught missing a degree requirement!**

Transfer courses marked with an "L" can be submitted as meeting some of the graduation requirements, but can not be counted toward the "45 hours of 300 level or above" courses which must be submitted for graduation.

GRADUATION GPA AND GRADES REQUIREMENTS

Just as your Academic Status (Good Status, Warning, Suspension, Dismissal) depends on your cumulative GPA, your graduation does also. You must present a cumulative GPA of 2.000 or above in order to be awarded the BS degree.

No C- or D grades in ECE, ENGR or CS courses may be submitted for the BS CpE and no C- or D grades in ECE, BENG or ENGR courses may be submitted for the BS EE.

COMPUTER ENGINEERING DEGREE REQUIREMENTS WORKSHEET/CHECKLIST

2009-2010 CATALOG

	Completed/ Grade(s)	Needed

GENERAL EDUCATION REQUIREMENTS (24)

a. Composition: ENGL 101 (100), 302 (6) . . . . . _____ _____ _____ _____
b. Literature (3) . . . . . _____ _____
c. COMM 100 (3) . . . . . _____ _____
d. ECON 103 (3) . . . . . _____ _____
e. Western Civilization: HIST 100/125 (3) . . . . . _____ _____
f. Fine Arts: From department list
of approved courses (3) _____ . . . . . _____ _____
g. Global Understanding: From department list
of approved courses (3) _____ . . . . . _____ _____

MATHEMATICS AND BASIC SCIENCES (34 hours required)

a. MATH 125 (3) . . . . . _____ _____
b MATH 113, 114 (4,4) . . . . . _____ _____ _____ _____
c. MATH 213, 214 (3,3) . . . . . _____ _____ _____ _____
d. MATH 203 (3) . . . . . _____ _____
e. STAT 346 (3) . . . . . _____ _____
f. PHYS 160, 161 (3,1) . . . . . _____ _____ _____ _____
g. PHYS 260, 261 (3,1) . . . . . _____ _____ _____ _____
h. PHYS 262 (3) . . . . . _____ _____

ENGINEERING AND COMPUTER SCIENCES (62 hours required)

a. ENGR 107 (2) . . . . . _____ _____
b. CS 112, 211 (4,3) . . . . . _____ _____ _____ _____
c. CS 262, 367 (1,3) . . . . . _____ _____ _____ _____
d. CS 471 (3) . . . . . _____ _____
e. ECE 201(3) . . . . . _____ _____
f. ECE 220 (3) . . . . . _____ _____
g. ECE 280 (5) . . . . . _____ _____
h. ECE 331, 332 (3,1) . . . . . _____ _____ _____ _____
i. ECE 333, 334 (3,1) . . . . . _____ _____ _____ _____
j. ECE 445 (3) . . . . . _____ _____
k. ECE 447 (4) . . . . . _____ _____
l. ECE 448 (4) . . . . . _____ _____
m. ECE 465 (3) . . . . . _____ _____
n. Computer Engineering technical electives (list courses) (9)
1. _____ 2._____ 3. _____ . . . . . ___ ___ ___ ___ ___ ___
o. ECE 491, 492, 493 (1,1,2) . . . . . ___ ___ ___ ___ ___ ___

A miminum cumulative GPA of 2.000 must be presented to be approved for graduation.

No C- or D grades in ECE or ENGR or CS courses may be submitted for graduation.

MINIMUM HOURS TO GRADUATE: 120

ELECTRICAL ENGINEERING DEGREE REQUIREMENTS WORKSHEET/CHECKLIST

2009-2010 CATALOG

	Completed/ Grade(s)	Needed
GENERAL EDUCATION REQUIREMENTS (24)		
a. Composition: ENGL 101 (100), 302 (6)		
b. Literature (3)		
c. COMM 100 (3)		
d. ECON 103 (3)		
e. Western Civilization: HIST 100/125 (3)		
f. Fine Arts: From department list of approved courses (3) _____		
g. Global Understanding: From department list of approved courses (3) _____		
MATHEMATICS AND BASIC SCIENCES (32 hours required)		
a. MATH 113, 114 (4,4)		
b. MATH 213, 214 (3,3)		
c. MATH 203 (3)		
d. STAT 346 (3)		
e. PHYS 160, 161 (3,1)		
f. PHYS 260, 261 (3,1)		
g. PHYS 262, 263 (3,1)		
or for Bioengineering concentration: BIOL 213 (4)		
ENGINEERING AND COMPUTER SCIENCES (64 hours required)		
a. ENGR 107 (2)		
b. CS 112, 222 (4,3)		
c. ECE 101 (3)		
d. ECE 201 (3) or for Bioengineering concentration: BENG 201 (3)		
e. ECE 220 (3)		
f. ECE 280 (5)		
g. ECE 320 (3)		
h. ECE 331, 332 (3,1)		
i. ECE 333, 334 (3,1)		
j. ECE 305 (3)		
k. ECE 421 (3)		
l. ECE 433 (3)		
m. ECE 445 (3)		
n. ECE 460 (3)		
or for Bioengineering concentration: BENG 401, 402 (4,1)		
o. Advanced Engineering Labs (list courses) (2)		
1. _____ 2. _____		
or for Bioengineering concentration: Bioengineering and Advanced Engineering Labs (list courses) (2)		
1. BENG _____ 2. _____		
p. Senior technical electives (list courses) (9)		
1. _____ 2. _____ 3. _____		
or for Bioengineering concentration: (List courses) (6)		
1. _____ 2. _____		
q. ECE 491, 492, 493 (1,1,2)		
or for Bioengineering concentration: ECE 491, BENG 492, 493 (1,2,2)		

A miminum cumulative GPA of 2.000 must be presented to be approved for graduation.
No C- or D grades in BENG, ECE or ENGR courses may be submitted for graduation.

MINIMUM HOURS TO GRADUATE: 120

FULL-TIME ELECTRICAL, COMPUTER and BIOENGINEERING FACULTY

ALLNUTT, J. E., Director of MS in Telecommunications Program and Professor, Ph.D. University of Salford, UK, 1970. Satellite communications, radiowave propagation.

BERRY, A.K., Associate Professor, Ph.D. University of Missouri, 1985. Growth and characterization of semiconductor materials, thin films, and photovoltaics.

CHANG, S.C., Associate Professor, Ph.D. University of Hawaii, 1977. Information theory; computer communications networks; error-correcting codes.

COOK, G., Earle C. Williams Professor, Sc.D. Massachusetts Institute of Technology, 1965. Control systems; robotics; signal processing; digital simulation.

EPHRAIM, Y., Professor, D.Sc. Technion-Israel Institute of Technology, 1984. Statistical signal processing; array signal processing; speech processing.

GAJ, K., Associate Professor, Ph.D., Warsaw University of Technology, 1992. Communication systems and networks; computer-network security; VLSI design and testing; VLSI CAD; computer architectures.

GERTLER, J.J., Professor, Ph.D., 1967, Sc.D. 1980, Hungarian Academy of Sciences. Identification, adaptive control, fault detection and expert system approach to these; real-time programming and operating systems for microprocessors.

GRIFFITHS, L., Dean, School of Information Technology and Engineering, Ph.D. Stanford University, 1970. Signal processing.

HINTZ, K.J., Associate Professor, Ph.D. University of Virginia, 1981. Microprocessors; self-organizing machines; pattern recognition; signal processing.

IKONOMIDU, V.N., Assistant Professor, Ph.D. Aristotle University of Thessaloniki, Greece, 2002. Devleopment and diagnostic applications of MRI; signal processing; experiment optimization.

IOANNOU, D.E., Professor, Ph.D. University of Manchester, England, 1978. Device characterization; semiconductor materials.

JABBARI, B., Professor, Ph.D. Stanford University, 1981. Digital communications; computer communication networks; switched telecommunications networks.

KAPS, J-P., Assistant Professor, Ph.D. Worcester Polytechnic Institute, 2006. Cryptography, ultra-low power digital circuit design, computer arithmetic, efficient cryptographic algorithms, computer and network security.

KATONA, P., Professor, Sc.D. Massachusetts Institute of Technology, 1965. Biomedical engineering with emphasis on control of the cardiovascular and respiratory systems.

LEVIS, A.H., University Professor, Sc.D. Massachusetts Institute of Technology, 1968. Distributed intelligence systems; variable structure distributed architectures; Petri nets.

LI, Q., Assistant Professor, Ph.D. North Carolina State University, 2004. Advanced CMOS devices and nanoelectronics.

MANITIUS, A.Z., Chair and Professor, Ph.D. Polytechnical School of Warsaw, 1968. Control of time-delay; distributed parameter systems; adaptive control; computational methods in control.

MARK, B.L., Associate Professor, PhD. Princeton University, 1995. Design and performance of computer network architectures and protocols.

MULPURI, V.R., Professor, Ph.D. Oregon State University, 1985. Large bandgap semiconductor (SiC, GaN, etc) materials, and devices (ion-implantation doping, ohmic contacts, device fabrication, material and device characterization)Semiconducting opto-electronic materials; microwave devices.

NELSON, J. K., Assistant Professor, Ph.D. University of Illinois, 2005. Equalization techniques for communications in the presence of inter-symbol interference, low-complexity equalizers in a high-SNR regime, universal equalizers, digital signal processing.

PACHOWICZ, P., Associate Professor, Ph.D. Stanislaw Staszic Technical University, Poland, 1984. Machine vision/perception, automatic target recognition, machine learning for engineering problems, evolving self-adaptive system, knowledge-based systems, autonomous agents, intelligent systems, simulation and modeling, intelligent robotics.

PANCRAZIO, J.J., Professor, Ph.D. University of Virginia, 1990. Neural prosthesis; neurotechnology; bioengineering for neuroscience; diagnostic technologies for brain injury and chemical exposure; deep brain stimulation technology development..

PANDULA, S, Instructor, Ph.D. George Mason University, 2008. Communication theory; Information theory and statistical signal processing; MIMO, OFDM and CDMA systems.

PARIS, B-P, Associate Professor, Ph.D. Rice University, 1990. Multiuser communications systems, including multiple-access control strategies and code-division multiple-access; statistical signal processing; mobile radio systems, including fading multi-path channels and traffic control.

PEIXOTO, N., Assistant Professor, Ph.D. University of Sao Paulo, 2001. Neuro-enginering , biomedical engineering.

SIKDAR, S., Assistant Professor, Ph.D. University of Washington, 2005.Biomedical signal and image processing, biomedical devices and instrumentation.

SUTTON, W.G., Associate Chair and Associate Professor, Ph.D. Air Force Institute of Technology, 1981. Engineering education; semiconductor device physics; VLSI design.

WAGE, K., Associate Professor, Ph.D. Massachusetts Institute of Technology, 2000. Signal processing and array antennas for underwater acoustic wave propagation.