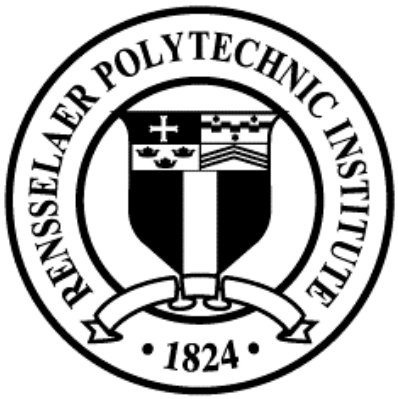

RENSSELAER POLYTECHNIC INSTITUTE

School of Engineering

Electrical, Computer, and Systems Engineering

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ELECTRICAL ENGINEERING

Electrical Engineering is a dynamic and broad field that creatively applies physics and mathematics to the design, research, development, testing and maintenance of diverse products prevalent in society today. From cell phones to smart cars, Light Emitting Diodes to autonomous robots, nano to macro, electrical engineering continues to grow as an integral part of our multidisciplinary, technological society.

The fun side of Electrical Engineering is: Feeling as if you are an integral part of making an idea reality. All the while you think to yourself, "I can't believe they are paying me to play with so many high tech toys that also help people!"

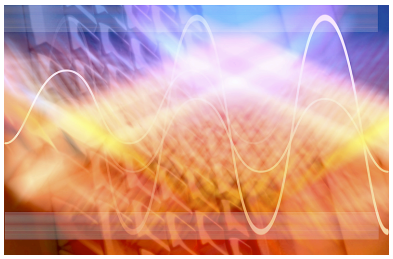
Key & Related Courses: Fields & Waves I, Embedded Control, Signals and Systems, Microelectronics Technology, Introduction to Electronics

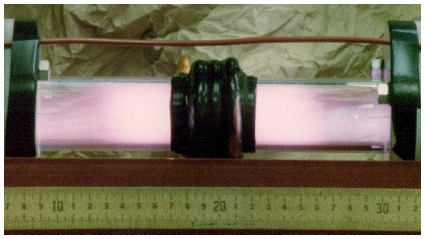
Areas of Concentration: Communications, Information and Signal Processing; Control, Robotics, and Automation; Microelectronics and Photonics Technology; Circuit and Computer Hardware Design, Plasma Engineering and Electromagnetics; Electric Power

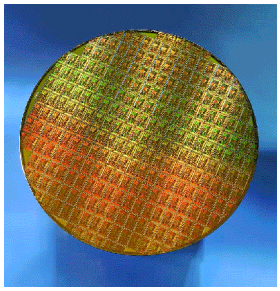
Employment and Career Opportunities: Electrical Engineering graduates with a bachelor's degree provide the backbone for a wide variety of technological fields. From designing sensors for the automotive industry to implementing circuits for defense companies to creating imaging products in the medical field, electrical engineers enable scientific ideas in many areas of technology. According to Jobweb, a career development and website for new college grads, electrical engineering is at the top of the engineering job demand curve at all degree levels with a very clear lead over other engineering disciplines for M.S. and PhD degrees. The U.S. Dept. of Labor also projects a 10.8% increase in employment through 2014. In addition, annual average job opportunities are highest for electrical and electronics engineers at 23,000.

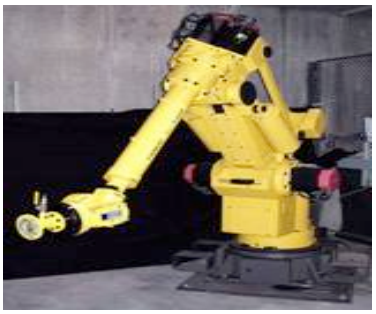
Typically, during the first year or two after a bachelor's degree, the young engineer would get to know the company's products, expectations, and procedures before selecting a technical niche. That niche may include, design, development, implementation, testing, and characterization of various technologies. On the job, hands on experience, supplements theory learned in the classroom. For this reason, internships or co-ops before graduation increase chances of early success in this career path. In Spring 2007, RPI students are participating in co-ops with companies such as IBM, GE Energy, Proctor & Gamble, Pratt & Whitney, Advanced Micro Devices, and Mitre Corporation. For more information about co-ops or internships visit the career development center and their website at http://www.rpi.edu/dept/cdc/.

"A Bachelor of Science degree in engineering with a specialty in electrical engineering may also serve as a starting point for careers in many other fields, ranging from business to law, medicine, and politics, since the problem-solving skills acquired in an electrical engineering program provide an extraordinarily valuable asset. The same skills will equip you to assume leadership roles in your community and in professional circles outside the workplace." (*2001 IEEE, Inc.*) Management and electrical engineering is becoming a popular combination with a need for technical expertise in leadership. Decision making from a technical point of view is often sought and encouraged in electrical engineers whose aspirations are to lead. The finance industry has also become a primary employer of electrical engineers.









Undergraduate Research and Graduate School: Most electrical engineers eventually continue on to grad school where they further develop their expertise with the goal of leading technology into new and exciting areas of application. Continuing education is needed for a career in research and development. Usually M.S. students pursue their degrees with financial assistance from their employers. EE students in doctoral programs can plan on full financial support which includes tuition and stipends so such programs are essentially free. Participation in an undergraduate research project (URP) is an excellent way to learn about research and graduate studies. More details about undergraduate research can be found on the ECSE Department URP webpage at http://www.ecse.rpi.edu/urte/index.html.

COMPUTER AND SYSTEMS ENGINEERING

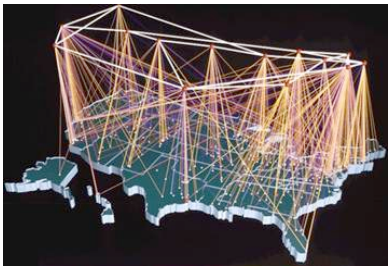
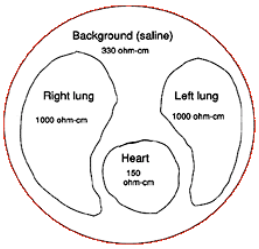
Computer and Systems Engineering is a dynamic field that creatively applies computers and mathematics to the design, development, testing and implementation of a wide range of products. From secure wireless networks to medical imaging systems, from autonomous mobile robots to face recognition security systems, from aircraft control systems to mapping the world, from distributed underwater pollution sensors to the next generation Internet, from handheld games to MP3 players, these systems are built by RPI computer engineers.

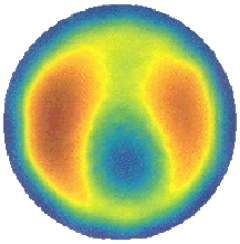
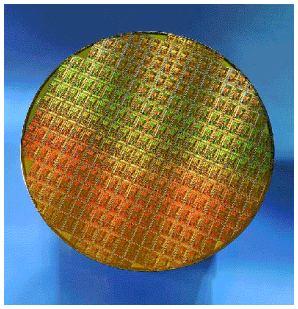
The fun side of Computer and Systems Engineering is: Using all kinds of cool computers and equipment, and really understanding how they work, while also seeing the huge positive impact they have on society and our quality of life.

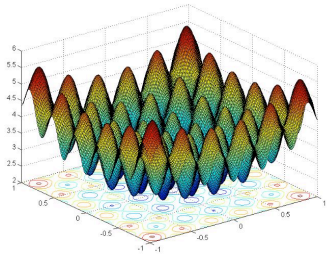
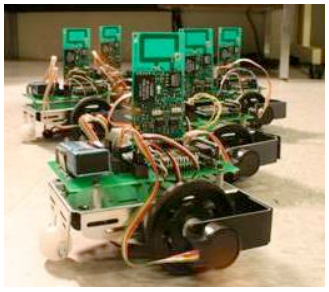
Key & Related Courses: Embedded Control, Electric Circuits, Signals and Systems, Computer Components and Operations, Computer Architecture, Networks, and Operating Systems, Sensing and Imaging, Probability for Engineering Applications.

Areas of Concentration: Automatic Control and Robotics, Communications and Information Processing, Computer Graphics & Applications, Computer Hardware, Computer Networks, Computer Systems, Manufacturing, Computer Vision, VLSI Design.

Employment and Career Opportunities: Computer and Systems Engineering graduates with a bachelor's degree provide the backbone for a wide variety of technological fields and enjoy tremendous freedom in choosing the types of projects they want to work on. In many cases, a computer engineer may decide to focus on building a tool or a product that meets a need they feel passionate about. For example, a computer engineer who suffered a loss in his or her family due to illness might invest their energy on developing software that manages medical equipment or help to bring back the enjoyment of music to someone with profound hearing loss. According to Jobweb, a career development and website for new college grads, computing and computer engineering are at the top of the engineering job demand curve at all degree levels, especially for M.S. and PhD degrees. Overall, information technology based career opportunities remain exceptionally strong and are expected to lead job growth well into the future. Typically, during the first year or two after a bachelor's degree, the young engineer would get to know the company's products, expectations, and procedures before selecting a technical niche. That niche may include, design, development, implementation, testing, and characterization of various software and hardware technologies. On the job, hands on experience supplements theory learned in the classroom. For this reason, internships or co-ops before graduation increase chances of early success in this career path. Currently, RPI students are participating in co-ops with companies such as IBM, GE Energy, Proctor & Gamble, Pratt & Whitney, Advanced Micro Devices, and Mitre Corporation. For more information about co-ops or internships visit the career development center and their website at http://www.rpi.edu/dept/cdc/.
Management and computer engineering is becoming a popular combination with a need for technical expertise in leadership. Decision making from a technical point of view is often sought and encouraged in computer engineers whose aspirations are to lead. The finance industry has also become a primary employer of CSE grads. Computer and Systems Engineers who go on to graduate school are looking to go beyond seeking solutions to immediate needs but look to project and steer future technologies through discovery and innovation.

Undergraduate Research and Graduate School: In addition to the BS degree, the CSE program also offers MS and PhD degrees. The MS degree can be a terminal degree or used as preparation for a PhD program. Continuing education is needed for a career in research and development. Usually M.S. students pursue their degrees with financial assistance from their employers. EE students in doctoral programs can plan on full financial support which includes tuition and stipends so such programs are essentially free. Participation in an undergraduate research project (URP) is an excellent way to learn about research and graduate studies. More details about undergraduate research can be found on the ECSE Department URP webpage at http://www.ecse.rpi.edu/urte/index.html.

Career Links

The US Department of Labor (http://www.bls.gov/oco/ocos027.htm) provides information on the various fields of engineering and statistics concerning salary and job outlooks. Explore engineering careers with these Department of Labor links.

Nature of the Work

Training, Other Qualifications, and Advancement

Employment

Job Outlook

Projections

Earnings **&** ***Wages***

Related Occupations

Sources of Additional Information

Contact List for ECSE

Department Head:	Kim Boyer (kim@ecse.rpi.edu)	JEC 6052
Administrative Assistants:	Carol Wagar ((carol@ecse.rpi.edu)	JEC 6049
	Priscilla Magilligan (pris@ecse.rpi.edu)	JEC 6012
Advising Coordinator:	David Nichols (nichols@ecse.rpi.edu	JEC 6046
Transfer Student Advisor	David Nichols (nichols@ecse.rpi.edu	JEC 6046
Graduate Admissions:	Ann Bruno (ann@ecse.rpi.edu)	JEC 6010
Class of 2014 Advisors	Lester Gerhardt (gerhal@rpi.edu)	JEC 7003
	Qiang Ji (jiq@rpi.edu)	JEC 7004
	John Wen (wenj@rpi.edu)	CII 8011
	Jian Sun (jsun@ecse.rpi.edu)	JEC 5009
	David Nichols – Fall 2010 only	
	Alhussein Abouzeid – Spr. 2011 and after	
	abouzeid@ecse.rpi.edu	JEC6038
	Michael Shur (shurm@rpi.edu)	CII 6015

Advising Responsibilities

Student's responsibilities

- To know their advisor's office hours, email address, and advising schedule.
- To make, and keep, appointments and prepare for registration advising by reviewing the templates, Class-Hour Schedule on SIS, and Curriculum Advising & Program Planning worksheet (CAPP). Take with you a copy of your CAPP to the meeting.
- To formulate questions regarding curriculum, course selections, career options, etc. Take with you a list of questions.
- To be aware of their academic and personal needs and to seek assistance when needed. It's OK to ask your advisor for directions.
- To understand that the role of their advisor is to provide information and to advise you, but not to make decisions for you. Our goal is for every student to become an active participant in their education, not only while at Rensselaer but for their life time.

Advisor

- To be accessible to students throughout the year at posted office hours. If an advisor will be away from campus for an extended period of time, he or she should post the names and office locations of alternate advisors outside their offices, so that students will have other advising resources.
- To set aside designated times for registration advising and individual discussions.
- To be knowledgeable about current curriculum requirements, academic policies and procedures, referrals and resources on campus, and career opportunities in the major field.
- To guide students through academic programs that will complement their personal, educational, and professional interests.

ECSE Advising Tasks,

by Year

The Purposes for Meeting with Your Advisor

	Visions	Your Roadmap	People to Meet
Entering RPI		Adjust ECSE template/plan for AP credit	
First Year	Choosing or changing a major	Exploring your plan and template	Getting to know your Advisor
Second Year	Learning and deciding about URP's, Internships, Co-op's, and Study Abroad	Adjust plan for overloads, dropped or failed courses	Getting to know at least one faculty in major
Third Year	Planning 4th year, deciding about work and grad school	Adjust plan for co-op, overloads, dropped or failed courses.	Getting to know another faculty in major
Fourth Year	Creating a vision for career or grad school or both	Preparing applications for job and/or grad school	Asking faculty for recommendations

Threads

Threads are sequences of courses that are linked like beads by prerequisite or co-requisite relationships. Threads frequently have branches. It is very important to understand the role that Threads play in the planning of your course selection. So, here are two challenges for you! And you wouldn't be at RPI unless you liked challenges!

For a given course find the pre- and co-requisites for that course AND the courses for which the given course is a prerequisite. Then make a diagram of the Thread. Hand drawn diagrams are fine; something more electronic is also allowed.

First Challenge: Determine the Thread for ECSE-2010 (Electric Circuits), First find the prerequisites for Circuits and then the prerequisites for the prerequisites. Use the Course Catalog. Then peruse the catalog to see which courses have Circuits as a prerequisite. And for those courses you find, determine for which courses they are prerequisites. Hint: pay attention to ECSE-2410 & ECSE-2050.

Second Challenge: Determine the Thread for ECSE-2610 (Computer Components & Operations or COCO).

ACADEMIC INFORMATION AND REGULATIONS

The Institute requires a degree candidate to earn the last 30 credits in courses completed on this campus or through a program formally recognized by the Institute. Transfer courses are limited to two courses or eight credits counting toward the student's last 30 credits and require approval of the director of the Advising and Learning Assistance Center.

Baccalaureate candidates must have passed all of the prescribed academic work and have satisfied the fee requirements. Candidates must also be in good academic and disciplinary standing. Undergraduate students on probation at the time of completion of course work may be required to meet certain stipulations for removal from probation. However, such requirements may be waived for those students whose cumulative GPAs satisfy the baccalaureate degree requirements. In general, a term's work with grades of not less than C will be required in programs arranged by the Committee on Academic Standing. The director of the Advising and
Learning Assistance Center will state requirements to the students in writing.

Degree candidates must be registered during the semester in which they intend to graduate and must file a degree application with the registrar by the dates specified in the academic calendar. Students who previously applied for graduation but did not complete all their requirements on time must submit a new application specifying the new date of graduation.

Double Degrees

A student may become a candidate for a second baccalaureate degree when he or she has completed: (1) the equivalent of at least two terms (30 credit hours) of additional work beyond the requirements of a single degree, and (2) the courses in the department in which the student is registered and such other courses as are required for the second degree.

Dual Majors

ECSE students sometimes pursue a dual major, usually in a field closely allied with ECSE. CSE majors can add Computer Science as a CSE/CS dual majors and EE majors can add Applied Physics to become EE/AppPhy dual majors. Other combinations of majors are possible but may require more than eight semesters to complete. Before deciding on a dual major, meet with your advisor, or David Nichols, to learn more about it. Dual majors rarely have room in their schedules for Free Electives.

Minors

ECSE majors frequently complete a minor in a field of interest, other than engineering, by using Free Electives and/or the HASS Electives. A minor is a set of courses coherently based on subject, methodology, or other factors. Many departments offer one or more such minors; several of the minors are interdisciplinary. A student wishing to complete a minor should consult with the adviser for that minor before completing the second course in it (departmental secretaries have this information). Minors vary in their requirements from 15 to 21 credit hours. Courses for the minor may not be taken on a Pass/No Credit basis. No course which is required for a major can be used for a minor requirement. No course which is required for one minor can be used for another minor requirement.

ELECTRICAL ENGINEERING CURRICULUM CHECKLIST Class of 2014 (revised)

NAME: _____ E-mail: _____

CSCI-1100	Computer Science I	4			ENGR-1200	Eng. Graphics & CAD[1]	1	
MATH-1010	Calculus I	4			CHEM-1100	Chemistry I	4	
ENGR-1100	Intro. to Eng. Analysis	4			MATH-1020	Calculus II	4	
	Hum., Arts or Soc. Sci. El.	4			PHYS-1100	Physics I	4	
						Hum., Arts or Soc. Sci. El.	4	
MATH-2400	Intro. to Differential Eqns.	4			ENGR-2350	Embedded Control	4	
PHYS-1200	Physics II	4			ECSE-2010	Electric Circuits	4	
	Multidisciplinary Elective[1]	4			ECSE-2610	Cptr. Comp. & Operations	4	
	Hum., Arts or Soc. Sci. El.	4			MATH-2010	Multivar Calc & Matrix Alg	4	
ENGR-2050	Intro. to Eng. Design	4			ECSE-2100	Fields & Waves I	4	
ECSE-2050	Intro. to Electronics	4			ECSE-2210	Microelectronics Tech.	3	
ECSE-2410	Signals & Systems	3			ECSE-2110	Electrical Energy Systems	4	
ECSE-2500	Engineering Probability	3				Free Elective[2,3]	3-4	
	Professional Devel. II[1]	2						
ENGR-4010	Professional Devel. III[1]	1				Restricted Elective[1]	3	
	Design Elective[1]	3				Concentration Elective II	3	
	Lab Elective[1]	3				Free Elective[1,2]	3-4	
	Concentration Elective I	3				Free Elective (if needed)[2]	3-4	
	Free Elective[1,2]	3-4				Hum., Arts or Soc. Sci. El.	4	
	Hum., Arts or Soc. Sci. El.	4						

[1] May be taken either term.
[2] The free electives must total to at least 12 credits.
[3] Students are encouraged to select a life science course, such as BIOL-1010.

128 credits minimum

RESTRICTED ELECTIVE
ECSE-4xxx, ECSE-6xxx or ENGR-4xxx.

MULTIDISCIPLINARY ELECTIVES
ENGR-1600 Materials Science for Eng.
ENGR-2090 Engineering Dynamics
ENGR-2250 Thermal & Fluids Eng. I
ENGR-2530 Strength of Materials

CONCENTRATION ELECTIVES
Students must select two courses in one of the concentration areas. See the CSE Homepage for areas and course lists.

LAB ELECTIVES
ENGR-4710 Adv. Manufacturing Lab I
ECSE-4160 (EPOW-4030) Electric Power Eng. Lab
ECSE-4090 Mechatronics
ECSE-4220 VLSI Design
ECSE-4690 Experimental Networking
ECSE-4760 Real-Time Cntrl & Comm.
ECSE-4770 Cptr H'ware Design
ECSE-4790 Microprocessor Systems

DESIGN ELECTIVES
MANE-4220 Inventor's Studio (F, S)
ECSE-4900 ECSE Design (F, S)

COMPUTER AND SYSTEMS ENGINEERING CURRICULUM CHECKLIST Class of 2014 (revised)

NAME: _____ E-mail: _____

ENGR-1200	Eng. Graphics & CAD[1]	1			MATH-2800	Intro. to Discrete Structures	4	
ENGR-1100	Intro. to Eng Analysis	4			MATH-1020	Calculus II	4	
MATH-1010	Calculus I	4			CSCI-1200	Data Structures	4	
CSCI-1100	Computer Science I	4				Hum., Arts or Soc. Sci. El.	4	
	Hum., Arts or Soc. Sci. El.	4						
ENGR-2350	Embedded Control	4			ECSE-2660	Cptr Arch, Nets, & Op Sys	4	
ECSE-2610	Cptr. Comp. & Operations	4			MATH-2400	Intro. to Differential Eqns	4	
CSCI-2300	Introduction to Algorithms	4			PHYS-1200	Physics II	4	
PHYS-1100	Physics I	4			CHEM-1100	Chemistry I	4	
ENGR-2050	Intro. to Eng. Design	4			ECSE-2410	Signals & Systems	3	
ECSE-2010	Electric Circuits	4			ECSE-2050	Intro. to Electronics	4	
MATH-2010	Multivar Calc & Matrix Alg.	4			ECSE-2500	Engineering Probability	3	
	Hum., Arts or Soc. Sci. El.	4				Free Elective[2,3]	3-4	
						Hum., Arts or Soc. Sci. El.	4	
ENGR-4010	Professional Devel. III[1]	1				Professional Devel. II[1]	2	
	Concentration Elective I	3-4				Concentration Elective II	3-4	
	Restricted Elective[1]	3-4				Design Elective[1]	3	
	Computer Eng Elective	3-4				Free Elective[1,3]	3-4	
	Free Elective[1,3]	3-4				Hum., Arts or Soc. Sci. El.	4	
						Free Elective (if needed) [2]	3-4	

[1] May be taken either term.
[2] The free electives must total at least 12 credits.
[3] Students are encouraged to select a life science course, such as BIOL-1010.

129 credits minimum

RESTRICTED ELECTIVE
ECSE-4xxx , ECSE-6xxx, CSCI-4xxx, CSCI-6xxx or ENGR-4xxx.

CONCENTRATION ELECTIVES
Students must select two courses in one
of the concentration areas. See the ECSE Homepage for areas and course lists.

COMPUTER ENGINEERING ELECTIVES
ECSE-4690 Experimental Networking
ECSE-4670 Comp. Comm. Networks
ECSE-4750 Computer Graphics
ECSE-4790 Microprocessor Systems
CSCI-4380 Database Systems
CSCI-4440 Software Dsg & Doc

DESIGN ELECTIVES
MANE-4220 Inventor's Studio (F, S)
ECSE-4900 ECSE Design (F, S)

Revised 3/7/2009

EE AND APPLIED PHYSICS* DUAL MAJOR CURRICULUM CHECKLIST Class of 2014 (revised)

NAME: _____ E-mail: _____

ENGR-1100	Intro. to Eng. Analysis	4			ENGR-1200	Eng. Graphics & CAD[1]	1	
CSCI-1100	Computer Science I	4			MATH-1020	Calculus II	4	
MATH-1010	Calculus I	4			CHEM-1100	Chemistry I	4	
	Hum., Arts or Soc. Sci. El.	4			PHYS-1100	Physics I	4	
						Hum., Arts or Soc. Sci. El.	4	
ENGR-2050	Intro. to Eng. Design	4			ENGR-2350	Embedded Control	4	
MATH-2400	Intro. to Differential Eqns.	4			ECSE-2010	Electric Circuits	4	
PHYS-1200	Physics II	4			ECSE-2610	Cptr. Comp. & Operations	4	
BIOL-1010	Intro. to Biology[1]	4			MATH-2010	Multivar. Calc. & Matrix Alg.	4	
ECSE-2050	Intro. to Electronics	4			ECSE-2210	Microelectronics Tech.	3	
ECSE-2410	Signals & Systems	3			PHYS-2350	Experimental Physics	4	
PHYS-2100	Intro. Theoretical Physics	4			PHYS-4210	Electromagnetic Theory	4	
MATH-4600	Advanced Calculus	4			ECSE-2110	Electrical Energy Systems	4	
ECSE-2500	Engineering Probability	3				Hum., Arts or Soc. Sci. El.	4	
ECSE-4010	Professional Devel. III[1]	1				Professional Devel. II[1,2]	2	
ECSE-4220	VLSI Design	3			ECSE-4900	ECSE Design[1]	3	
PHYS-2330	Intermediate Mechanics	4			PHYS-4420	Thermody. & Stat. Mechanics	4	
PHYS-2510	Quantum Physics	4			PHYS-4370	Research Participation	4	
	Microelectronics Elective[1]	3-4				Hum., Arts or Soc. Sci. El.	4	
	Hum., Arts or Soc. Sci. El.	4						

[1] May be taken either term.
[2] May be taken in the third year

138 credits minimum

* EE must be your first named major. Otherwise an additional 2 credit hours of H&SS are required.

MICROELECTRONICS ELECTIVE
ECSE-4080 Semiconductor Pwr Electronics
ECSE-4250 Int. Ckt. Process & Design
ECSE-4720 Solid-State Physics

Revised 3/7/2009

EE AND CSE DUAL MAJOR CURRICULUM CHECKLIST Class of 2014 (revised)

NAME: _____ E-mail: _____

ENGR-1100	Intro. to Eng. Analysis	4			ENGR-1200	Eng. Graphics & CAD[1]	1	
MATH-1010	Calculus I	4			MATH-1020	Calculus II	4	
CSCI-1100	Computer Science I	4			MATH-2800	Intro. Discrete Structures	4	
	Hum., Arts or Soc. Sci. El.	4			CSCI-1200	Data Structures	4	
						Hum., Arts or Soc. Sci. El.	4	
ENGR-2350	Embedded Control	4			ECSE-2660	Cptr Arch, Nets, & Op Sys	4	
ECSE-2610	Cptr. Comp. & Operations	4			MATH-2400	Intro. to Differential Eqns	4	
CSCI-2300	Introduction to Algorithms	4			PHYS-1200	Physics II	4	
PHYS-1100	Physics I	4			CHEM-1100	Chemistry I	4	
ENGR-2050	Intro. to Eng. Design	4			ECSE-2050	Intro. to Electronics	4	
ECSE-2010	Electric Circuits	4			ECSE-2100	Fields & Waves I	4	
	Multidisc. Elective[1]	4			ECSE-2410	Signals & Systems	3	
MATH-2010	Multivar Calc & Matrix Alg	4			ECSE-2500	Engineering Probability[3]	3	
	Hum., Arts or Soc. Sci. El.	4			ECSE-2110	Electrical Energy Systems	4	
ENGR-4010	Professional Devel. III[1]	1				Professional Devel. II[1,2]	2	
ECSE-2210	Microelectronics Tech.	3				Design Elective[1]	3	
	Computer Eng Elective[1]	3-4				Restricted Elective[1]	3-4	
	Lab Elective[1]	3				Concentration Elective 2	3-4	
	Concentration Elective 1	3-4				Hum., Arts or Soc. Sci. El.	4	
	Hum., Arts or Soc. Sci. El.	4						

[1] May be taken either term.
[2] May be taken in the third year
[3] For some choices of Concentration Electives, it is necessary to take ECSE-2210 here and delay ECSE-2500 until the senior year

135 credits minimum

RESTRICTED ELECTIVE
ECSE-4xxx, ECSE-6xxx, CSCI-4xxx, CSCI-6xxx or ENGR-4xxx.

MULTIDISCIPLINARY ELECTIVES
ENGR-1600 Materials Science for Eng.
ENGR-2090 Engineering Dynamics
ENGR-2250 Thermal & Fluids Eng. I
ENGR-2530 Strength of Materials

COMPUTER ENGINEERING ELECTIVES
ECSE4690 Experimental Networking
ECSE-4670 Comp. Comm. Networks
ECSE-4750 Computer Graphics
ECSE-4790 Microprocessor Systems
CSCI-4380 Database Systems
CSCI-4440 Software Dsg & Doc

LAB ELECTIVES
ECSE-4690 Experimental Networking
ECSE-4770 Cptr. H'ware Design
ENGR-4710 Adv Manufacturing Lab I
ECSE-4790 Microprocessor Sys
ECSE-4160 (EPOW-4030) Electric Power Eng. Lab
ECSE-4090 Mechatronics
ECSE-4220 VLSI Design
ECSE-4760 Real-Time Cntrl & Comm.

CONCENTRATION ELECTIVES
Students must select two courses in one of the concentration areas. See the ECSE Homepage for areas and course lists and seek opinion from advisor.

DESIGN ELECTIVES
MANE-4220 Inventor's Studio (F, S)
ECSE-4900 ECSE Design (F, S)

Revised 3/7/2009

CSE AND COMPUTER SCIENCE* DUAL MAJOR CURRICULUM CHECKLIST Class of 2014 (revised)

NAME: _____ E-mail: _____

ENGR-1100	Intro. to Eng. Analysis	4		MATH-2800	Intro. to Discrete Structures	4	
ENGR-1200	Eng. Graphics & CAD[1]	1		MATH-1020	Calculus II	4	
MATH-1010	Calculus I	4		CSCI-1200	Data Structures	4	
CSCI-1100	Computer Science I	4			Hum., Arts or Soc. Sci. El.	4	
	Hum., Arts or Soc. Sci. El.	4					
ENGR-2350	Embedded Control	4		ECSE-2660	Cptr Arch, Nets, & Op Sys	4	
ECSE-2610	Cptr. Comp. & Operations	4		CHEM-1100	Chemistry I[4]	4	
CSCI-2300	Introduction to Algorithms	4		MATH-2400	Intro. to Differential Eqns	4	
PHYS-1100	Physics I	4		PHYS-1200	Physics II	4	
ENGR-2050	Intro. to Eng. Design	4		ECSE-2410	Signals & Systems	3	
ECSE-2010	Electric Circuits	4		CSCI-4430	Programming Languages	4	
CSCI-2400	Models of Computation	4		CSCI-4210	Operating Systems	4	
MATH-2010	Multivar Calc & Matrix Alg.	4		ECSE-2050	Introduction to Electronics	4	
	Hum., Arts or Soc. Sci. El.	4		ECSE-2500	Engineering Probability	3	
ENGR-4010	Professional Devel. III[1]	1			Professional Devel. II[1,3]	2	
BIOL-1010	Intro. to Biology[1]	4			Design Elective[1]	3	
CSCI-4440	Software Design & Doc.	4			Concentration Elective 2[2]	3-4	
	Concentration Elective 1[2]	3-4			CSE/CS Elective[2]	3-4	
	Hum., Arts or Soc. Sci. El.	4			Hum., Arts or Soc. Sci. El.	4	

[1] May be taken either term.

[2] **Concentration Elective 1, Concentration Elective 2, Design Elective and CSE/CS Elective must include 3 courses that satisfy the CSE/CS Elective description given below**. Some choices for Concentration and Design Electives may require that additional CSE/CS Electives be taken to meet this requirement.

[3] May be taken in the third year

[4] Intro. to Biology (shown in senior year) can be taken here, with Chemistry I moving to the senior year

* CSE must be your first named major. Otherwise an additional 2 credit hours of H&SS are required.

134 credits minimum

MULTIDISCIPLINARY ELECTIVES
ENGR-1600 Materials Science for Eng.
ENGR-2090 Engineering Dynamics
ENGR-2250 Thermal & Fluids Eng. I
ENGR-2530 Strength of Materials

CONCENTRATION ELECTIVES
Students must select two courses in one of the concentration areas. See the ECSE Homepage for areas and course lists.

CSE/CS ELECTIVE
Any course numbered CSCI-4xxx, CSCI-6xxx, ECSE-46xx or ECSE-47xx may be used, excluding ECSE-4630, ECSE-4640, ECSE-4720 and reading and independent study courses. ECSE-4480 and ECSE-4490 may also fulfill this requirement.

DESIGN ELECTIVES
MANE-4220 Inventor's Studio (F, S)
ECSE-4900 ECSE Design (F, S)

Revised 3/7/2009

EE AND BIOMEDICAL ENGINEERING DUAL MAJOR CURRICULUM CHECKLIST Class of 2014 (revised)

NAME: _____ E-mail: _____

ENGR-1100	Intro. to Eng. Analysis	4			ENGR-1200	Eng. Graphics & CAD[1]	1	
CSCI-1100	Computer Science I	4			MATH-1020	Calculus II	4	
MATH-1010	Calculus I	4			BIOL-2120	Intro. to Cell & Molec. Bio.	4	
	Hum., Arts or Soc. Sci. El.	4			PHYS-1100	Physics I	4	
						Hum., Arts or Soc. Sci. El.	4	
CHEM-1100	Chemistry I	4			BMED-2200	Modeling of Biomed. Sys.	4	
MATH-2400	Intro. to Differential Eqns.	4			ECSE-2010	Electric Circuits	4	
PHYS-1200	Physics II	4			ENGR-2600	Mod. & Anal. Uncertainty[3]	3	
ENGR-2350	Embedded Control	4			ECSE-2610	Cptr. Comp. & Operations	4	
	Hum., Arts or Soc. Sci. El.	4			MATH-2010	Multivar Calc & Mat. Alg.	4	
BIOL-4290	Human Physiological. Sys.	4			BMED-4500	Advanced Sys. Physiology	4	
ENGR-2050	Intro. to Eng. Design	4			ECSE-2210	Microelectronics Tech.	3	
ECSE-2410	Signals & Systems	3			ECSE-2050	Intro. Electronics	4	
ECSE-2100	Fields & Waves I	4			ECSE-2110	Electrical Energy Systems	4	
					ECSE-2800	Sensing and Imaging	3	
ENGR-4010	Professional Devel. III[1]	1				Professional Development II[2]	2	
BMED-4010	Bioengineering Lab	4			ECSE-4900 or BME-4600	ECSE Design or BME Design	3	
	EE Concentration Elective I	3-4				EE Concentration II	3-4	
	BME Concentration Elective	3-4				EE Restricted Elective	3-4	
	Hum., Arts or Soc. Sci. El.	4				Hum., Arts or Soc. Sci. El.	4	

1 May be taken either term.

2 May be taken in the third year

3 May be replaced with ECSE-2500 Engineering Probability (ECSE-2410 is a co-requisite, so it should be taken in the 5th semester)

135 credits minimum

EE RESTRICTED ELECTIVE
ECSE-4xxx, ECSE-6xxx or ENGR-4xxx.

BME CONCENTRATION ELECTIVE
Selected to satisfy the BME Concentration requirements. Students should consult their BME advisor in selecting this course.

EE CONCENTRATION ELECTIVES
Students must select two courses in one of the concentration areas. See the ECSE Homepage for areas and course lists.

Registration

When: Registration for the Spring semester generally occurs in early November. Registration for the Fall semester occurs the preceding Spring, usually in early April Exact dates are included in the Academic Calendar.

How: Use the Student Information System (SIS) to register for your courses.

Where: There are no assigned rooms for registration. You can register for your classes using any computer with Internet access.

Time tickets

As a student at Rensselaer, you are issued a "time ticket," which assigns to you a specific window of time during which you may register for the next semester. Your time ticket will be sent to your RPI email address, 3 - 4 weeks before registration. In addition to making the registration assignment, this e-mail message notifies you of any existing 'holds' which may prevent you from registering if you do not resolve them.

School of Engineering	
Freshman	0 - 30
Sophomore	31 - 60
Junior	61 - 95
Senior	96 - 128

Your registration time is assigned based on the number of credit hours you have **earned** as a student. The table to the right shows the range of earned credit hours associated with each class. Please note that classes which are still in progress or courses which have been graded as "incomplete" do *not* count towards earned credits.

CAPP reports

Your Curriculum Advising and Program Planning (CAPP) report is a planning and advising tool, available only to undergraduate students, that allows you to track the progress you're making toward your Bachelor's Degree. You can access your CAPP report by logging in from the main menu of the Student Information System (SIS). The CAPP is *not* an official document of the Institute; it is a tool.

Registration FAQs

Q: What do I do if a class I want to register for is full?
A: Meet with the instructor of the course and request to be admitted to the course. If the class is a core/required course every effort will be made to accommodate the request. If this is an elective course you may be asked to take it in a subsequent semester.

Q: How do I add/drop a course?

A: You may use the Student Information System (SIS) to add or drop courses. Generally speaking, from the beginning of the semester, you will have **two weeks to add** courses and **eight weeks to drop** them. Please refer to the Academic Calendar for specific add and drop deadline dates. Meet with your advisor about the changes you want to make.

If you wish to petition to add or drop classes after the published deadline, you may do so using a Late Add/Drop Form. Please note that after the instructors signature (if required), the form must also be approved by the Advising and Learning Assistance Center.

Undergraduate Research Program (URP)
http://undergrad.rpi.edu/update.do?catcenterkey=77
URP application: http://undergrad.rpi.edu/update.do?artcenterkey=117

Rensselaer has a very strong Undergraduate Research Program. This is a program that allows students to work in a professor's laboratory for credit, cash, or experience. On average, we have 30% of the class taking advantage of these opportunities during their Rensselaer career.

The program offers many advantages and the opportunity to:

- work on a project whose impact could be worldwide and can lead to patents and/or grants
- apply knowledge gained in the classroom to actual problems and research situations
- network with faculty beyond the classroom, opening the door to other opportunities
- gain critical leadership, team-building and critical thinking skills
- publish as an undergraduate
- receive course credit in a more dynamic way or supplement your income

How to find a project
Most URP projects are found through direct contact with the faculty member supervising the research. Most undergraduates find projects from faculty members from whom they have taken classes. A good place to start your search is to determine a faculty member with whom you may want to work on a project. Check their website to investigate their field of research. If it sounds interesting, approach them about a possible URP project.

What if I have my own idea for a project?
You may work with a faculty member on an existing research project or on a project based on your own ideas. If you want to pursue your own project, find a faculty advisor who may be interested in your topic since you will be required to have a project advisor.

For credit, funding or the experience?
You can earn from one to four credit hours per semester for your participation in the URP. The number of credit hours you earn is negotiable between you and your faculty sponsor. If you choose this option you and your sponsor need to:

- Determine how many credit hours you will earn
- Decide exactly what is expected of you, such as your time commitment, the type of work to be submitted, etc.
- Agree on how your grade will be determined

In the past, students who have participated in the URP for pay have earned up to $3,000 per semester. The majority of participants earn $400 per semester.
URP funding comes from two sources:

- Your sponsoring faculty member or department, and/or
- The Office of Undergraduate Education

The faculty sponsor or department is responsible for the financial support of your research. In addition, the Office of Undergraduate Education pays URP participants a maximum of $400 per semester in the form of matching funds.

Most projects expect eight to twelve hours of work per week.

The URP application should be submitted to, George Narode (JEC 6030); who:

- Checks the URP Application for completeness
- Fills out your payroll paperwork
- Forwards your application and payroll paperwork to the Office of Undergraduate Education for approval
- Will set up a schedule for reporting your hours. You must submit your hours to the Department Coordinator within the same payroll period that you worked. Please keep in mind that if you work and submit hours that exceed your funding allotment, you will not be paid for those hours. Pay checks are issued every other Friday

Applying for the Experience

No deadline specified. You would have the opportunity to apply to gain the experience of working on a research project.

Who can I work with?

The chart below has the research areas of our department listed as well as faculty names. Go to the ECSE Department section of the Course Catalog and fill in the chart with x's where a faculty member's name and interest intersect. The result will help you decide who you should ask to take you on as a URP.

Research Areas and Related Faculty

	Communications & Signal Processing	Computer Vision & Digital Media	Computational Geometry	Computer Hardwear Architecture VLSI	Control, Robotisc & Automation	Electric Power & Enery Systems	Plasma Science & Electromagnetics	Microelectronics	Phototonics	Computer Networking	Mixed Signal Design	Electronics
I. Bhat												
K. Boyer												
J. Chow												
TP Chow												
K Connor												
P Dutta												
R Franklin												
M Hella												
R Huang												
Q Ji												
A Julius												
K Kar												
R Kraft												

Y LeCoz												
J Lu												
J McDonald												
G Nagy												
L Parsa												
R Radke												
B Roysam												
S Salon												
A Sanderson												
G Saulnier												
S Sawyer												
P Schoch												
F Schbert												
M Shur												
B sikdar												
J Sun												
K Vastols												
J Wen												
J Woods												
M Wozny												
B Yazici												
T Zhang												

Study Abroad for EE's & CSE's

Study Abroad opportunities exist for both EE and CSE majors, as well as some of our popular dual majors. However, planning is required to minimize the effect on the graduation date of the participant. In most cases, Study Abroad does not delay graduation.

ECSE students who choose to participate in International Study should do so during the Junior year (5th or 6th semester) or after completing 64 credits. This means that the decision to study abroad should be made during the 4th semester of study, at the very latest, so that a plan for the entire junior year can be made with the guidance of the student's advisor. For students who enter RPI with a substantial number of AP credits this may mean the decision to study abroad will be made in the 3rd semester or even earlier. Consultation Week in October or March is a good time to speak with your advisor about planning for International Study.

EE majors are encouraged, but not limited, to study abroad during the 5th semester; CSE majors the 6th semester. Study abroad for an entire year is not recommended with the exception of participants in the Congress Bundestag Youth Exchange program.
(Visit http://undergrad.rpi.edu/setup.do for details.)

For course equivalents, please check the "Transfer Equivalency Catalog" listing, which can be found on the Log In page of the Student Information System (SIS):
http://sis.rpi.edu/ . The courses are listed by institution. Recent history suggests that ECSE majors who study at DTU or NTU have the fewest problems enrolling in appropriate courses for the major. But do not limit your search to only these two universities. You may find a gem hidden just out of view that matches your unique desires.

When choosing from the list of pre-approved courses, be aware that the course abroad may not be taught every semester. Check with the university's web site to determine in which semester the course is taught. Predictions of a year in advance are usually accurate.
If you are considering coursework that does not appear on the pre-approved list, please provide the course description from the university abroad and if possible a syllabus for that course. A prior approval form has to be completed and signed by the International Adviser of the Department. The forms are available on the Registrar's website http://www.rpi.edu/dept/srfs/transfer_credit_approval.pdf

ECSE students may transfer courses that will be used as Free electives or Humanities, Arts, and Social Sciences electives. Indeed, we encouraged our students to take Humanities and Social Science (H&SS) courses that cover the history, language or culture of the host country.

HASS courses at RPI are 4 credit hours but many, if not most, foreign universities offer 3 credit HASS courses. So one can wind up a credit short per course requiring an additional course to fulfill the credit hour requirement rules of RPI. However, excess HASS credits can be, and frequently is, used as 'Free Elective' credits.

In all cases, prior approval of transfer credit is emphatically encouraged and from a student perspective, this prior approval is the 'guarantee' they should have that coursework taken abroad will count towards their graduation requirements at RPI.

Such International Study, or Semester Abroad as it is sometimes called, is coordinated by the Office of International Programs (OIP), located in 4103 Walker Lab. For general information about International Study visit the OIP web site:

http://undergrad.rpi.edu/update.do?catcenterkey=81 .

ECSE students who choose to participate in International Study should do so during the Junior year (5th or 6th semester). This means that the decision to study abroad should be made during the 4th semester of study so that a plan for the entire junior year can be make with the guidance of the student's advisor. (For students with a substantial number of AP credits this may be the 3rd chronological semester.) Consultation Week in March is a good time to talk with your advisor about planning for International Study.

Students may also participate in a year-long fellowship program know as the Congress Bundestag Youth Exchange (CBYX) which offers the opportunity for intensive German language instruction, a semester of coursework at a German University, and a five-month internship placement in Germany. Participation in this program may delay graduation by a semester but the internship and language instruction will more than compensate for the delay.
For more information visit:

http://undergrad.rpi.edu/setup.do

Graduate School

The ECSE Department currently offers the MS, MEng, and PhD degrees in Electrical Engineering and in Computer and Systems Engineering. Students who wish to continue their studies beyond the BS degree should have a very good academic record and begin planning the application process in the 5th semester.

For more information about our graduate school see the graduate school sections of the Institute catalog, as well as the ECSE Department web site. Also ask your advisor about grad school opportunities.

Students frequently think they cannot possibly afford graduate school. But the road to a PhD is essentially toll free. Most students are granted tuition wavers, in addition to receiving an assistantship stipend for living expenses. Students can graduate with a PhD without having added to their debt load.

If you are a very good student, consider applying to graduate school. It is easier to go directly from undergraduate studies to grad school than to wait for several years before enrolling.

Co-Terminal BS-MS Degrees: An Honors Program

ECSE students who have achieved exceptionally high grades in the first three years are invited to apply to the Co-terminal Honors Program. This program allows students to complete the BS and MS (or MEng) degrees by extending their undergraduate financial aid for an additional two semesters and continuing their undergraduate status into the fifth year. Upon completion of the requirements both the BS and the MS (or MEng) degrees are awarded.

For more information pay a visit to JEC 6012 and pick up a Co-terminal information packet.

Remarkable Bookmarkable Links

Advising and Learning Assistance Center: http://alac.rpi.edu/setup.do
When you need academic help or you're willing to help others

Career Development Center: http://www.rpi.edu/dept/cdc/
Looking for an internship, co-op, or career? This is the place.

Course Catalog: http://www.rpi.edu/academics/catalog/
It's all here! Course descriptions, rules, and faculty names & interests.

ECSE Department: http://www.ecse.rpi.edu/
Department News & Information. Keep up to date with ECSE.

Institute News & Links: http://rpinfo.rpi.edu/
Great home page with handy links. RPI calendar and news.

International Programs: http://undergrad.rpi.edu/update.do?catcenterkey=81
Study abroad in Singapore or Denmark or Wales or …?

IEEE – The RPI Student Branch: http://www.ecse.rpi.edu/homepages/ieee/
Connect with students, researchers, and industry professionals in EE

Eta Kappa Nu (HKN) – http://www.ecse.rpi.edu/hkn/
The international honor society for electrical engineers.

Registration Forms: http://srfs.rpi.edu/update.do?catcenterkey=29
Forms for all occasions: Changing majors, transferring credits, etc

Student Handbook: http://www.rpi.edu/dept/doso/2006-2008RPI-StudentHandbook.pdf
Rules and Policies

Student Information System: http://sis.rpi.edu/
Jumping off page for registration & records, including CAPP!

Frequently Asked ECSE Questions

Q: Do I have to repeat a required course in my major if I get a D in it?
A: No. Currently, a grade of D or D+ in any undergraduate course is considered passing.
Q: Can I take one of my Restricted or Concentration Electives on a P/NC basis?
A: No. The P/NC option is only for Free Electives and one non-depth HASS course.
Q: Can I undo a P grade?
A: Maybe. But you need to notify the Registrar's Office in writing by Friday of the 13th week of the semester in which you elected to use P/NC. However, once the P grade is on your transcript it is generally considered to be a permanent grade.

Q: I am a dual major and have two advisors. Do I need to meet with both of them before I can register for classes?
A: Yes. You will need to be cleared or 'SAM-ed' by each of your academic advisors before you can register.
Q: But my roommate is a dual major, too, and he only has one advisor. Why do I need two?
A: When the two majors are in the same department, such as EE and CSE, a single advisor can reasonably be expected to know both curricula. But with disparate majors, ECON and EE for example, it is best to have an advisor from each field of study.
Q: What if I am on co-op or at the Danish Technical University when registration starts? How can I possibly meet with my advisor?
A: Electronic meetings are permitted under these circumstances. Send your advisor an email to alert him/her about your situation well before registration begins.
Q: I don't know who my advisor is. How can I find out?
A: Go to SIS and view your CAPP. Your advisor's name will be on the top right hand side. Then determine your advisor's office and email by using the RPI directory. Send him/her an email and ask for a meeting.

Q: My CAPP is messed up. I've heard that I won't be able to graduate? What do I do?
A: First, be assured that your graduation status is determined by at least two human beings. The CAPP report is a tool to help plan and monitor academic progress. It does not decide who can graduate. Second, print a copy of your CAPP and, using a pencil/pen, tidy up the CAPP and show the edited version of your CAPP to your advisor. If your advisor agrees with your redacting, he/she can email the Registrar's Office and have the changes made.
Q: I just began my senior year. How can I tell if I will graduate on time?
A: Print a copy of your CAPP and meet with your advisor. He/she will help you assess your progress and plan for your last semester. If you want a second opinion, meet with David Nichols. (JEC 6046)

Q: Do I really have to take CompSci I (CSCI-1100)? I read the syllabus and I think I know it all already.
A: Some students do skip CompSci I and take the following course, Data Structures (CSCI-1200). However, you will have to replace the credits for CompSci I. For CSE majors and CSE/CS dual majors the replacement course must be another CSCI course. For EE majors, the replacement can be any technical course (Science or Engineering).
Q: Can I use VLSI Design both as my Lab Elective and as a Concentration Elective?
A: No. Each course can satisfy only one requirement.
Q: I took Calculus I at another university but it is only 3 credits and RPI's Calc I is 4 credits. Do I have to make up one credit of calculus?

A: No. But you will have to complete the proper number of credits. This may mean choosing a 4-credit course to satisfy a 3-credit requirement later on. This answer applies to other courses as well.