EGN 1002: Introduction to Engineering
Electrical & Computer Engineering
College of Engineering
University of Florida

Where and when does EGN 1002 meet for ECE?

- **Wednesday sections:** from 3:00-4:00pm in BLK 315; from 4:00-6:00pm in BEN 327

BLK (Black Hall) and BEN (Benton Hall) are south of the J. Wayne Reitz Student Union, across Museum Road, on the other side of the parking lot. A campus map is available at http://campusmap.ufl.edu/ .

What is Electrical Engineering (EE)?

Electrical engineering is a professional engineering discipline that applies the laws of physics governing electricity, electronics and electromagnetism. With the rapid growth in information technology, digital control systems, and robotics, EEs must have a solid understanding of electricity and magnetism as well as the ability to continually update their knowledge of electrical/electronics, mechanical, and chemical systems.

What is Computer Hardware Engineering (CEN)?

Computer hardware engineering is a professional engineering discipline that combines elements of both electrical engineering and computer science. Computer engineers have training in the areas of software design and hardware-software integration. In turn, they focus less on power electronics and physics. Computer engineers are involved on all aspects of computing, from the design of individual microprocessors, personal computers, and supercomputers, to circuit design.

SubjuGator 6 (2007). UF SubjuGator teams have won the 2005, 2006 and 2007 international autonomous robotic submarine competitions (sponsored by AUVSI and ONR).

In the hardware courses, students study the functional behavior of integrated circuit components and the design of complex digital systems. In our ECE department courses, each of the concepts are first studied in the classroom and then implemented in the lab. This implementation involves both hardware design and software design, i.e., programming. In the software system courses, students receive hands-on operating experience in different aspects of system software and their relations to hardware facilities. Courses in computer engineering also deal with pattern processing, machine intelligence and information system design and evaluation.

Wireless food-spoilage sensor

Electrical & Computer Engineering

Why choose Electrical Engineering or Computer Engineering?

There are many fields to choose from: Electronics, Computer Engineering, Electromagnetics and Energy Systems, Devices, and Signals and Systems. We will discuss the areas in more detail in a few minutes.

UF's ECE lightning research

Electrical engineers design products that meet human needs for today and tomorrow's high-power generating systems in dams, as well as the tiny electronic circuits that keep spacecraft on correct trajectory a billion miles from Earth. They create the electronic components that run computers, TVs, stereo systems, and automated factories and seek ways to improve the transmission of messages by laser beams.

Earning a degree in electrical or computer engineering, like all engineering disciplines, requires a considerable amount of time and energy, but the rewards are worth it.

You will have the opportunity to learn:
* Program languages including (but not limited to): C, C++, C#, Java, Assembly
* Hardware description languages including (But not limited to): VHDL, Verilog
* Analog Electronic Circuit Design
* Digital Logic and Digital Design
* Microprocessor Applications
* Control Systems
* Electromagnetics and Lightning
* Digital Integrated Circuit Design
* Solid-State Technology Device Electronics
* Integrated Chip Design
* Communications Systems and Signal Processing
* Optic and Photonic Systems
* Intelligent Machine Design
* And much more

MAV and sky/ground discrimination

Computer hardware engineers will have the opportunity to learn some of the above and also:
* Operating systems
* Computer Architecture
* Computer Communications
* Data Structures
* Software Engineering
* Numerical Analysis
* And much more

3mm2 motion sensor designed at UF
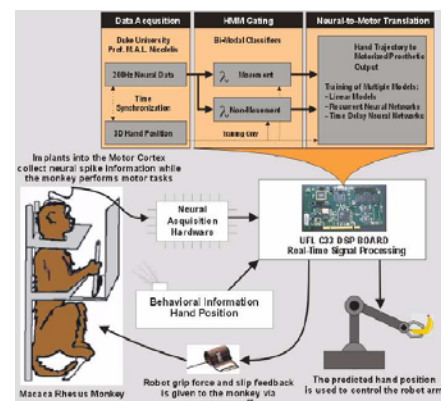
Brain-Machine Interface research

Electrical & Computer Engineering

How big is the ECE?
Established in 1910, the ECE department has built an international reputation for excellence in teaching, research, and service. We have an enrollment of over 770 undergraduate and 500 graduate students pursuing degrees in electrical and computer engineering.

Because of our size and emphasis on quality, we can provide unmatched diversity and richness of educational and research experiences. As boundaries across disciplines become fuzzy, many of our faculty members work across these focus areas -- even across departments -- providing opportunities for students to experience interdisciplinary research and education.

Quick Facts:
- **1910** – The Department of Electrical Engineering was established.
- **1993** – The Bachelor of Science degree was split into BSEE and BSCEN.
- **1996** – The department modified its name to include Computer and is now called the Department of Electrical and Computer Engineering.

Interested in programming?
Before jumping into a Computer Engineering from CISE or one of several Computer Science degrees offered on this campus, consider majoring in Computer Engineering from ECE, also known as a Computer Hardware Engineering or Computer Engineering with a Hardware emphasis. As a Computer Hardware Engineer from UF, you will be versatile in both hardware and software design, which makes you more marketable for both internships and jobs. As a student in the ECE Computer Engineering program, you will spend time working with actual hardware, using all your coursework to create tangible designs. You will program this hardware using the skills learned in your computer engineering courses.

Before deciding that computer programming is what you want to do for the next 10-20 years, give the hardware side a chance. Many high school and community college students learn how to program, but few have learned from a hardware perspective. With a few courses in ECE's computer engineering program, you will be able to make a more informed decision about the direction of your academic career.

Are there good teachers in ECE?
Several ECE faculty have earned teaching awards.

- UF Teachers of the Year:
  - Eric M. Schwartz, 2003
  - Haniph Latchman, 1998
  - Ramakant Srivastava, 1994

- IEEE Teaching Award:
  - Haniph A. Latchman, 1999

- UF College of Engineering Teacher of the Year
  - Eric M. Schwartz, 2003
  - Gijs Bosman, 1999
  - Haniph A. Latchman, 1998
  - Mark E. Law, 1997
  - Ramakant Srivastava, 1994
  - Herman Lam, 1992

You can see these and other awards won by our faculty at the following url:
http://www.ece.ufl.edu/people/faculty/honors.html

Electrical & Computer Engineering

NOTE:
Many job positions can be filled by a person with either a BSEE or BSCEN. You are not limiting yourself when you decide to go with one or the other. The choice is more dependent on the specialization area you decide to pursue.

Areas of Electrical and Computer Engineering

Electronics
- This division covers a broad range of topics from the manufacturing of integrated circuits to their applications in real world systems.
- Current research includes adaptive circuits, radio frequency circuits, VLSI design, microwave device and interconnect modeling, IC test, and modeling of materials, components and circuits for high-frequency power electronics.

Computer Engineering
- This division focuses on the theoretical and applied research by which next generation, high-performance computing and communications systems are designed, developed, and exploited.
- Research fields include high-performance computer architectures and networks, parallel and distributed computing, fault-tolerant computing, real-time systems, intelligent systems, microprocessor-based systems, and performance analysis.

Electromagnetics & Energy Systems
- This division spans a wide area of research of electromagnetic fields and their application. It includes power generation, distribution, and utilization of electrical energy. It also includes interaction wave guides, optical fiber, and photonic devices.
- UF is one of the few universities in the world conducting lightning research. Field research on lightning performed each summer both on the UF campus and at Camp Blanding, Florida.

Devices
- The device division focuses on the behavior, fabrication, and design of devices. These include optoelectronics (lasers, solar cells, detectors), transistors (SiGe, MIS [Metal Insulator Semiconductor]), MEM's [Metal Insulator Semiconductor] (mechanical, optical, biological sensors), and nanodevice concepts (carbon nanotubes).
- There is research on how materials interact with voltage, current, photons, and radiation as well as the current-voltage relationship of device structures.

Signals & Systems
- Studies in this field are related to the transmission, creation, manipulation, and understanding of signals and systems. Signal processing looks to take data from a wide variety of sources (speech, audio, images, video, radar, sensor networks) and transforming it into useable pieces.
- Communication systems are design to transmit information while minimizing the corruptive effects of noise and interference.

Electrical & Computer Engineering

How much do Electrical and Computer Engineers make?
Data found at www.salary.com (as of Feb 2009, some only available from July 2008)
- Electrical Engineer I (entry level – 0-2 years of experience)……………$52,000 to $63,000
- Electrical Engineer V………………………………………….…...$97,000 to $132,000
- Electrical Engineering Supervisor III …………….....................................$91,000 to $112,000
- Hardware Engineer I (entry level – 0-2 years of experience)…….……..$47,000 to $60,000
- Hardware Engineer 3………………………………………..…….$71,000 to $91,000
- Electrical Engineer (Asst, Assoc, Prof)..…………………….………....$66,000 to $104,000

Averages from June 2008 (salary.com)
- Electrical Engineer I
  - Base salary: $56,696
  - Total including benefits: $81,218
- Electrical Engineer II
  - Base salary: $71,628
  - Total including benefits: $102,094
- Electrical Engineer V
  - Base salary: $114,331
  - Total including benefits: $158,571
- Hardware Engineer II
  - Base salary: $66,779
  - Total including benefits: $94,539

Electrical Engineer I: Entry level, B.S., 0-2 years experience.
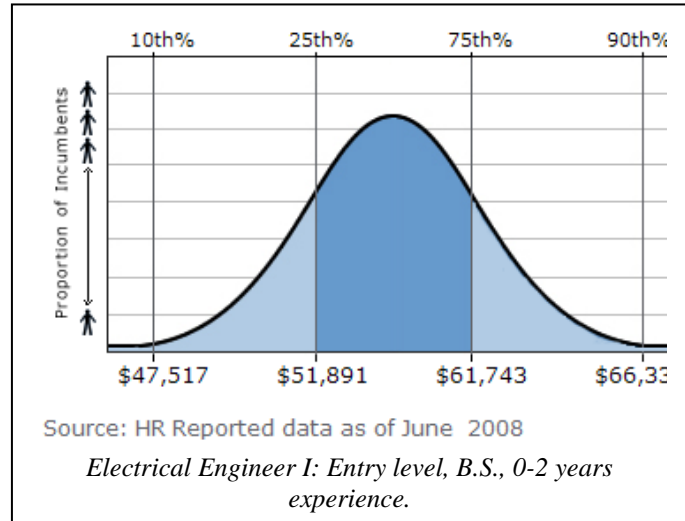
Salary info for UF's ECE department B.S. graduates from 2007
- Non-government (25 grads)
  - Average salary: $61,453.32
  - Maximum salary: $80,000 (4 grads)
  - Minimum salary: $51,000.00 (1 grads)
- Including government (armed forces, government lab, etc.) (31 grads)
  - Average salary: $57,301.35
  - Maximum salary: $80,000 (4 grads)
  - Minimum salary: $34,000 (1 grads)

What else can Electrical and Computer Engineers do graduate?
- Law
- Business and Management
- Medicine
- Research

Degree Programs (B.S. = Bachelor of Science)
- B.S in EE (BSEE)
- B.S. in CE (BSCEN) [hardware emphasis]
- B.S./M.S. Program
- B.S./Ph.D. Program
- Master of Science in EE (MSEE)
- Master of Engineering in EE (MEEE)
- Degree of Engineer in EE
- Doctor of Philosophy in EE(PhDEE)

Note: There is no Master of Science or PhD degree for computer engineering but you can still specialize in computer engineering.
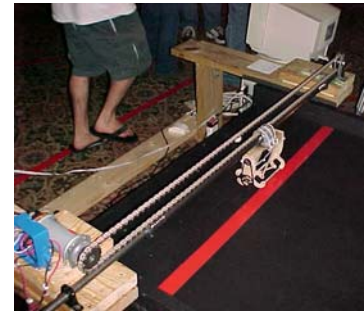
Electrical & Computer Engineering

Professional and Student Organization in ECE

 IEEE Institute of Electrical & Electronics Engineers

UF's champion pong robot from the 2002 IEEE SoutheastCon

- The IEEE, a non-profit organization, is the world's leading professional association for the advancement of technology. The website is http://ieee.org/ .
- IEEE is the world's largest professional organization with more than 365,000 members, including 68,000 students, in over 150 countries.
- IEEE is the largest student organization in ECE.
- IEEE produces 128 transactions, journals and magazines.
- Developer of standards such as IEEE 802.11 (Wifi), IEEE 802.15.1 (Bluetooth), IEEE 802.15.4 (Zigbee)

UF's 2004 IEEE SoutheastCon 2nd place T-shirt.

- The UF student chapter (http://ieee.ece.ufl.edu/) is very active. We participate in an annual conference in the Southeast USA (IEEE SoutheastCon http://www.sec09.com/). At SoutheastCon UF students regularly compete in several areas including: hardware (robot), software, research paper, and tee shirt. Competitions.
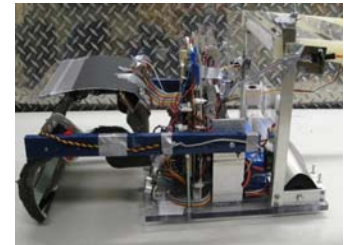- At the 2009 SoutheastCon in Atlanta, Georgia, we earned 1st Place in the Programming Competition and 3rd Place in the Ethics Competition.
- At the 2008 SoutheastCon in Huntsville, Alabama, our IEEE won far more awards than any of the more than 40 other universities in attendance, including rivals Georgia Tech and Virginia Tech. We placed in a record five of seven competitions. It was our best showing ever.

UF's 2009 IEEE SoutheastCon Recycling Robot

  - ➢ Student Paper Competition - 1st Place
  - ➢ Design Presentation Comp. - 1st Place
  - ➢ Software Competition - 2st Place
  - ➢ Ethics Competition - 2nd Place
  - ➢ Hardware Competition - 3rd Place

- Also in 2008, we earned second place in the IEEE-USA Video Scholarship Competition 2nd Place and seventh place (among 130 teams from 31 countries) in the IEEEXtreme 24 Hour Programming Challenge.
- Our IEEE student branch received the UF's Outstanding Program award for 2007-2008 for IEEE Career Week. The award recognizes creative and innovative programs hosted by an organization. We competed against more than 600 other student organizations at the UF.

UF's 2008 IEEE SoutheastCon 3rd place robot

Electrical & Computer Engineering

- IEEE was a sponsor and a driving force for the April 14th, 2008 presentation at the O'Connell Center by Adam Savage and Jamie Hyneman from the *MythBusters* TV program.
- We have BBQs, football seating blocks, annual camping trips, and on Wednesday mornings Coffee and Donuts outside of Larsen Hall (free morning snacks: Coffee, juice, doughnuts, bagels and fruit).
- **Come into IEEE's office (NEB 213) to meet current members.**

UF's 2007 IEEE SoutheastCon Ball-shooting Robot

Websites you'll like to check out

- UF's ECE Department Page: http://www.ece.ufl.edu/
- IEEE international website: http://www.ieee.org/
- IEEE UF student branch website: http://ieee.ece.ufl.edu/
- Electrical Engineering Honors Society: http://www.hkn.ece.ufl.edu/
- Women in ECE: http://www.wece.ece.ufl.edu/
- Description of EEL courses: http://www.registrar.ufl.edu/catalog/programs/courses/elcomen.html
- BS/MS info: http://www.ece.ufl.edu/academics/graduate/jointdegrees/bsms.html
- UF Faculty Evaluations: http://www.aa.ufl.edu/aa/dass/tcheval/search.asp
- Machine Intelligence Laboratory (ECE robotics laboratory): http://mil.ufl.edu/
- SubjuGator, UF's latest world champion autonomous underwater vehicle: http://subjugator.org/
- CRC's Career Fair: http://crc.ufl.edu/careerfairs/Events/Showcase/showcase.php

UF's 2008 SubjuGator.

Most of the information presented in this document can be found at one of the following:
www.ece.ufl.edu , www.wikipedia.org , www.ieee.org, www.salary.com

Cool videos from ECE:

- **Lightning lab videos:** http://www.lightning.ece.ufl.edu/pictures/lightning/videos.htm
- **Discovery Channel video of SubjuGator:** http://mil.ufl.edu/subjugator/press/DiscoveryChannel_2005sub.wmv
- **DARPA Urban Challenge on GMA:** http://mil.ufl.edu/1002/videos/Car_GoodMorningAmerica_10Mar08.mp4 (at time 4:31 in the video)
- **Urban Challenge video:** http://mil.ufl.edu/1002/videos/DARPA_TeamGatorNation.wmv
- **MRI Noise Reduction:** http://mil.ufl.edu/1002/videos/MRI_Noise_reduction.mp4
- **IEEE Robot from 2007:** http://mil.ufl.edu/1002/videos/ieee_SECon_07_Jacob_demo.avi
- **MEMs video:** http://mil.ufl.edu/1002/videos/MEMS_Technology.mpg
- **Dean Kamen's Prosthetic Arm:** http://mil.ufl.edu/1002/videos/Dean_Kamen_Luke_Arm.mp4
- **MAV videos:**
  - Watch out!: http://mil.ufl.edu/1002/videos/duck.mov
  - Real-time horizon estimation: http://mil.ufl.edu/1002/videos/horizon_tracking_f.mov
  - Self-stabilized flight: http://mil.ufl.edu/1002/videos/autonomous1_hf.mov

Have any questions? Email us.

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