Everything You Ever Wanted to Know About Graduate School*

***(but were afraid to ask)**

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What Questions Should I Ask?

- What is graduate school?
- Why should I go?
- What degree(s) do I want?
- When should I go?
- Where should I go?
- How do I get in?
- How long will it take to finish?
- How am I going to pay for it?
- What are my opportunities in Auburn's ECE Department?
- Where can I find more information?

What is graduate school?

- Advanced study beyond the bachelors degree
  - usually focus on a specialized area
  - build on foundation from previous study
  - many programs prepare you to do research

- "Professional" schools prepare for practice of a specific profession
  - law, medicine, dentistry, pharmacy

Why should I go to grad school?

- Career/Vocational Goals *(Study the market!)*
  - Does the job require an advanced degree?
  - improve/update skills & marketability
  - change careers (mobility)
  - higher salary/greater potential for advancement
- Personal fulfillment
  - love of the field
  - satisfy intellectual curiosity
  - the challenge of mastering a field
- *Postpone facing the "real world"??*

What degree(s) do I want?

- Masters Degree
  - higher starting salary
  - increased responsibility (immediate impact)
  - thesis (research) vs. non-thesis options
- Doctoral Degree
  - requires a research dissertation
  - needed for university faculty
  - research-oriented company/agency
- Master of Business Administration (M.B.A.)
  - if interested in engineering management
- Professional Degree: law, medicine, etc.

Graduate Degrees in ECE at Auburn University

ELECTRICAL AND COMPUTER ENGINEERING

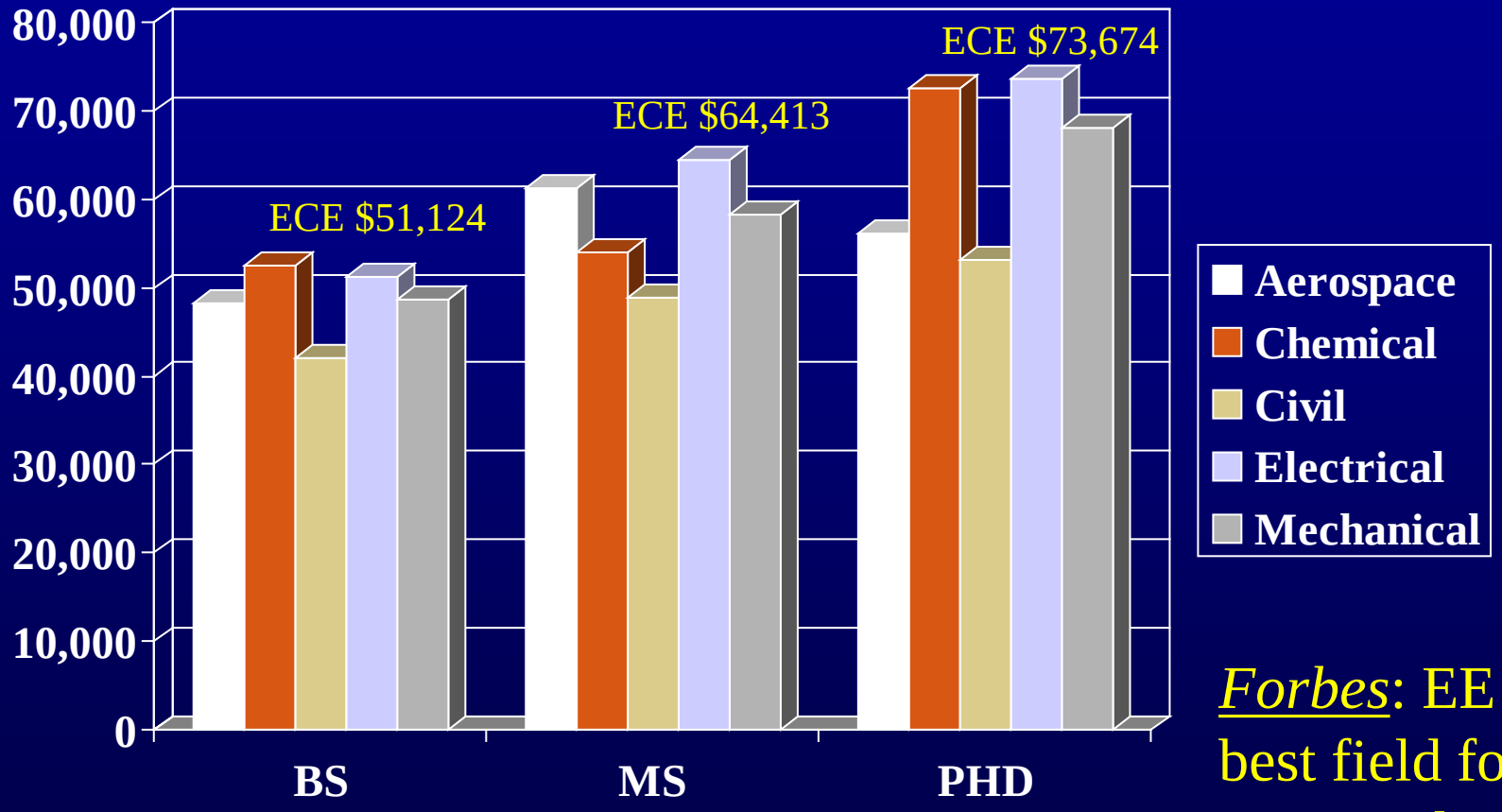
- Master of Science (MS)
  - Requires coursework, research & thesis
- Master of Electrical Engineering (MEE)
  - Requires coursework & project (non-thesis)

  (Coursework-only, effective Fall 2014)
- Doctor of Philosophy (PhD)
  - Requires publishable research & dissertation

Starting salaries for engineering

(2004 NACE Salary Survey: *www.naceweb.org*)

ELECTRICAL AND COMPUTER ENGINEERING



2013: EE-BS $63,400, CPE-BS $71,700
EE-MS $67,200, CPE-MS 73,900

Forbes: EE 3rd best field for masters degree improving salary

Where should I go?

- First decide what you want to study
  - "electrical engineering" is too general
  - more specific: "wireless network security"
- Research the school's reputation/activity in your technical interest area
  - Professors working in that area
  - publications & research funding in that area
  - courses taught in that area
  - research facilities, computing labs, library
  - industrial partnerships
  - who hires the graduates

Other considerations

- Availability of financial assistance
- Level of faculty/student interaction
- Degree requirements (credit hours, thesis vs. non-thesis, time to completion)
- Other – geographic location, extracurricular activities, cost of living, size of school
- Multiple degrees from the same school?
  - grad courses build on lower-level courses
  - different schools provide different perspectives
- *Apply to several schools!*

When should I go?

- Right after bachelors degree?
  - have academic "momentum" and discipline
  - fewer responsibilities when younger
  - improve marketability for first job
  - hard to give up a job later to return to school
- After gaining work experience?
  - work experience provides more perspective
    - better understanding of your field
    - learn what problems need to be solved/researched
  - may be "burned out" after 16+ years of school
  - can save money for school and/or pay off debts
  - employer might pay for school

How do I get in?

- Request materials (indicate desired program)
- Submit application and fee
- Other items you may be asked to provide:
  - Official transcripts (have your registrar send them)
  - Graduate Record Exam (GRE) scores
  - Letters of recommendation
    - address your skills, dedication, accomplishments, potential
  - A “statement of purpose”
    - explain your area of interest, experience, reason for applying
  - Your resume

What is the admissions committee looking for?

- Evidence of academic potential
  - grades* - especially math, science & engineering courses
  - reputation of school(s) attended
  - GRE scores*
  - TOEFL scores* (if international)

    **some departments require minimum GPA/GRE*
- Motivation for graduate study
  - statement of purpose
  - recommendation letters
  - other scholarly activity (undergrad research, etc.)
- Background (areas of previous study)

Auburn ECE Masters Program Entrance Requirements

- Bachelors degree in ECE or closely-related field from an accredited program
- GPA of accepted applicants usually > 3.0
  - lower GPAs can be offset by outstanding GRE scores and/or recommendation letters
- GRE general test
- TOEFL exam (international applicants)
- *Exceptional undergrad's can apply for direct admission to ECE doctoral program*

Graduate school entrance tests

- GRE – engineering & most other disciplines
  - General test has verbal, quantitative, and writing sections (V/Q scored 130-170 on each section, W scored 1-6)
  - Some schools may require a "subject test"
  - www.gre.org for test dates/places/info
- TOEFL – required for international applicants
  - some allow IELTS – *Int'l English Lang. Test Syst.*)
- Professional/business schools (instead of GRE)
  - GMAT for Business School
  - LSAT for Law School
  - MCAT for Medical School
- Fundamentals of Engineering (FE) – for professional registration (not a grad school requirement)

How long will it take?

- **"It depends..."**
  - degree requirements
  - work responsibilities (assistantship, job)
  - availability of courses
  - time for thesis/dissertation research and writing
  - your level of dedication
- Time to complete a masters degree
  - typically about 2 years if doing a thesis
  - non-thesis programs can take less time if full load taken every semester
- Doctoral degree typically 3-5 years
  - depends on time to research and write a dissertation

Masters degree requirements

- Typically about 30 semester credit hours
  - might require a set of “core” courses (plus electives)
  - might be entirely elective
- Thesis option:
  - identify a problem, conduct research, write the thesis
  - “defend” the thesis in front of a committee
- Non-thesis option:
  - might require coursework only
  - might require a “project”
  - might require a comprehensive exam (oral and/or written)

Auburn ECE Masters Degree Requirements

- 30-33 credits of 6000/7000 course work
  - at least 21 credits in major area & 24 credits at Auburn
  - at least one course in each of three ECE areas
- M.S. degree (30 credits) includes:
  - 4 to 6 hours of research & thesis (ELEC 7990)
  - final oral exam, defending the thesis
- M.E.E. degree (33 credits) includes:
  - 3-credit project (ELEC 7980)
  - written and oral project reports serve as the final exam

("Thesis" is published, "Project" report is not)

Auburn ECE Ph.D. Degree Requirements

- 60 semester hours beyond B.S.
  - At least 30 hours of graded graduate course work (6000-level or higher)
  - At least 30 additional hours of graduate course work (10 hours of 8990, ungraded, etc.)
- At least 30 hours at Auburn
- 9 hours in a minor area
  - Within or outside of ECE
- Dissertation

How am I going to pay for it?

- Graduate assistantship – receive stipend/tuition for work in the department
  - Teaching (conduct labs, grade papers, etc.)
  - Research
- Fellowships (university or external)
  - often grants not tied to specific work obligations
- Loans (use wisely – consider level of personal debt)
- Outside employment
- Employer-sponsored

Graduate Teaching Assistants

- GTAs assist with undergraduate instruction
  - laboratory sessions, grading homework
- Stipend depends on work load
  - typical is 1/6 time work load per lab section (varies with lab/grading assignment)
  - 1/3 time stipend = $853/month (1st yr. ECE M.S.)
- 1/3 -time or higher GTAs ($808/month) qualify for tuition waiver
  - Up to 40 hours (MS), 43 hours (MEE)
  - Up to 80 hours (PhD)

Graduate Research Assistants

- GRAs assist faculty in research activities
- Appointed by faculty with funded projects
- Stipend is a function of work load, as assigned by the appointing faculty member
  - 1/3 time = $1122/month (1st yr. ECE M.S.)
- 1/3-time or higher GRAs ($808/month) qualify for tuition waiver
  - Up to 40 hours (MS), 43 hours (MEE)
  - Up to 80 hours (PhD)

Samuel Ginn College of Engineering Woltosz Fellowships

- **Dean's Fellowship:**
  - Offered by the college of engineering.
  - Minimum stipend of $32,000 per year plus tuition fellowship and are renewable.
- **College Fellowship:**
  - Awarded to outstanding applicants throughout the college.
  - Minimum stipend of $24,000 per year plus tuition fellowship and are renewable.
- **Departmental Fellowship:**
  - Offered to top candidates in each engineering department
  - Minimum stipends of $20,000 per year plus tuition fellowship and are renewable.

Auburn University
Electrical & Computer Engineering

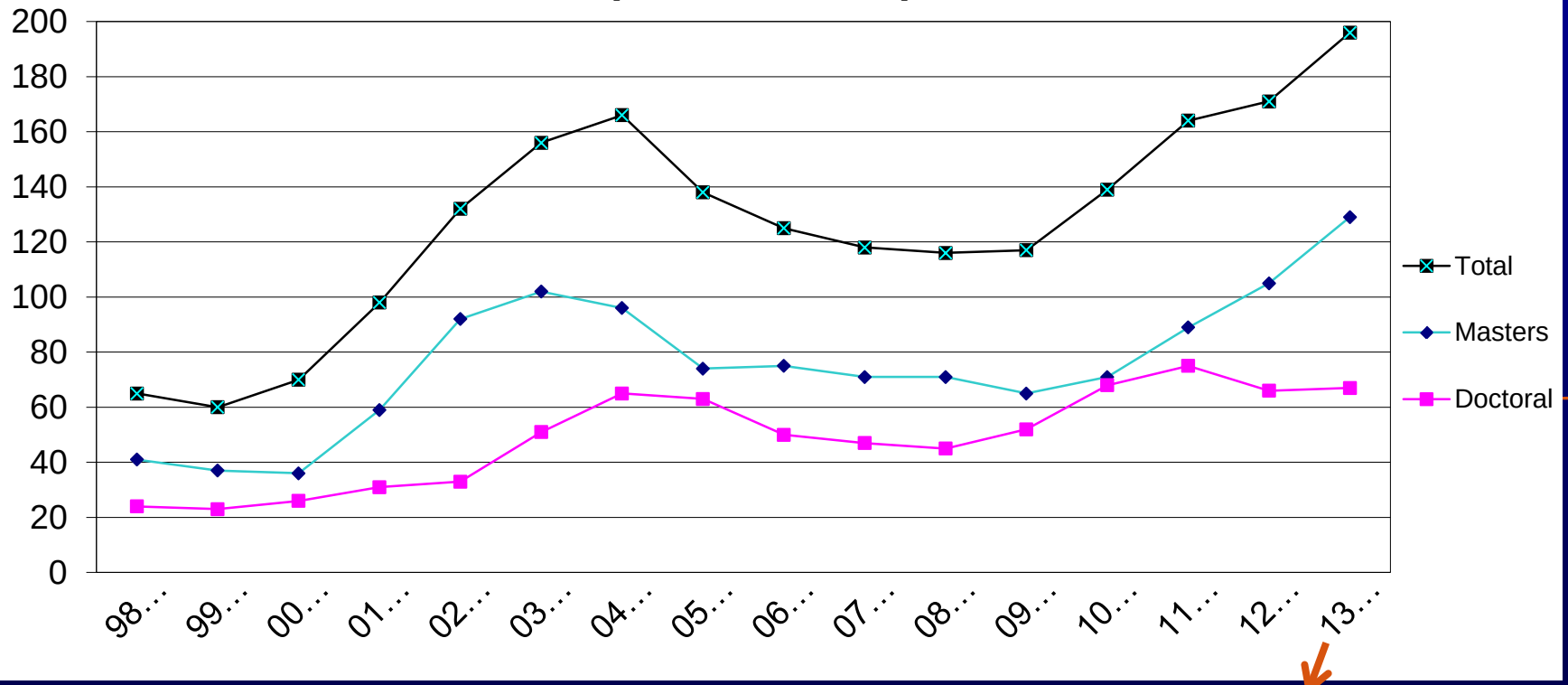
Graduate Faculty and Programs

U.S. News & World Report
Graduate Program Rankings

ELECTRICAL AND COMPUTER ENGINEERING

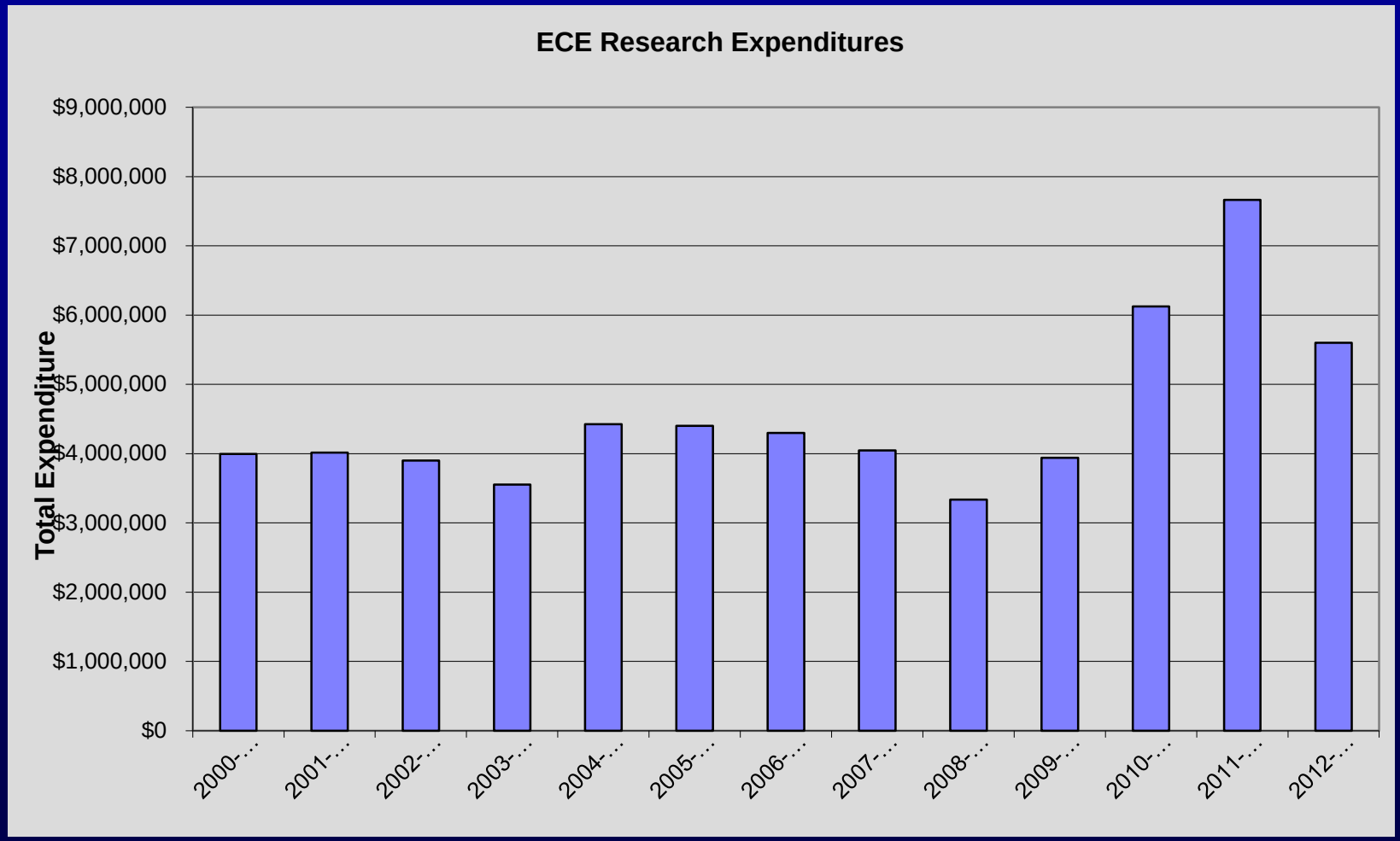
Electrical Engineering Programs:	2005	2006	2013
Auburn University	55th	49th	51st

ECE Graduate Enrollment
(Fall semesters, 1998-2013)



2013: PhD 67
MS 131
Total 198

ECE Research Expenditures



The ECE "Stems"

(loose organization of the 27 faculty)

Electronics:

microelectronics, amplifiers, analog, digital, and RF integrated circuits, MEMS …

Digital Signal Processing & Communications:

massage of complex electrical signals for information extraction, compression, correction …

Wireless:

wired and wireless data transmission, signal modulation, coding theory, information theory …

Automatic Control Systems:

electronic feedback techniques for process control, motor control, aerodynamics …

Electromagnetics:

generation and reception of electromagnetic waves, antennas, lasers, radar …

Power Engineering:

generation, transmission, distribution of electricity for commercial and residential …

Logic & Computing Devices:

architecture, VLSI design, testing, hardware, and software for computers and peripherals …

Circuits & Systems:

basic electrical circuit network theory, analysis of electrical signals …

Major Research Focus Areas in ECE

- MEMS (MicroElectroMechanical Systems)
- SiGe (Silicon-Germanium)
- VLSI design and test
- NanoTechnology
- High-performance computing
- Electric power engineering
- Electronic packaging
- Wireless networks
- Security
- Signal processing
- Smart antennas

ECE Research Sponors

Government

- AFOSR
- ARO
- DARPA
- DOE
- NASA
- NIH
- NSF
- ONR
- Sandia National Labs

Industry

- Diamler/Chrysler
- Henkel
- IBM
- Motorola
- Northrup/Grumman
- Semiconductor Research Corp.
- Southern Company
- Texas Instruments
- Whirlpool Corporation

Named Professorships in ECE

- **Prathima Agrawal,** *Sam Ginn Distinguished Professor*
- **Vishwani Agrawal,** *James J. Danaher Professor*
- **Thomas Denney**, *Ed & Peggy Reynolds Family Professor*
- **Mark Halpin,** *Alabama Power Distinguished Professor*
- **J. David Irwin,** *Earle C. Williams Eminent Scholar*
- **Shiwen Mao**, *McWane Associate Professor*
- **Guofu Niu**, *Alumni Professor*
- **Adit D. Singh,** *James B. Davis Professor*
- **Jitendra Tugnait,** *James B. Davis Professor*
- **Bogdan M. Wilamowski,** *AMSTC Director*

IEEE Fellows

- Prathima Agrawal
- Vishwani Agrawal
- Fa (Foster) Dai
- S. Mark Halpin
- John Hung
- David Irwin
- R. Mark Nelms
- Adit Singh
- Jitendra K. Tugnait
- Bogdan Wilamowski
- Chwan-Hwa (John) Wu

ECE Faculty National/International Awards

- Eta Kappa Nu National Outstanding Teacher Award
- (2) IEEE Undergraduate Teaching Award
- (2) IEEE Power Engineering Outstanding Educator Awards
- (2) IEEE McGraw Hill/Jacob Millman Awards
- (4) IEEE Third Millenium Medals
- (2) International Microelectronics and Packaging Society Technical Achievement Awards
- IEEE Computer Society Outstanding Contribution Award
- IEEE Richard M. Emberson Award
- (13) IEEE Fellows

ECE Faculty Scholarship & Professional Service

ELECTRICAL AND COMPUTER ENGINEERING

- Editors of International Journals—11
- Associate Editors of International Journals—40
- Books Published—38
- Book Chapters Published—32
- Patents—122
- Average Journal Papers Published/Faculty/Year—2
- Presidents of Technical Societies—10
- Chairs of Technical Conferences—40
- Technical Society Governing Board/AdCom Positions—31

Graduate School Application Time Table

- During undergraduate studies, consider participating in a research project with faculty/grad students
- Junior year – begin investigating
  - browse guides, catalogs, web sites
  - talk to faculty, friends
  - sign up for GRE and/or other entrance tests
- September/October of senior year
  - take GRE and/or other tests
  - write statement of purpose
  - request recommendation letters from faculty

(continued)

Graduate School Application Time Table (continued)

- November/December

  (applications typically due in December/January)

  – submit applications (on-line or mailed)

  – order official transcripts from Registrar's Office

  – apply for fellowships, grants, assistantships

- January/March

  – ask about visiting and/or /interviews

- March/April

  – consider acceptances, rejections, career options

- August/September – **Get to work!**

Application Deadline
Auburn ECE Graduate Programs

ELECTRICAL AND COMPUTER ENGINEERING

- Fall Semester
  - International Applicants: February 1
  - Domestic Applicants: July 1

- Spring Semester
  - International Applicants: August 1
  - Domestic Applicants: October 1

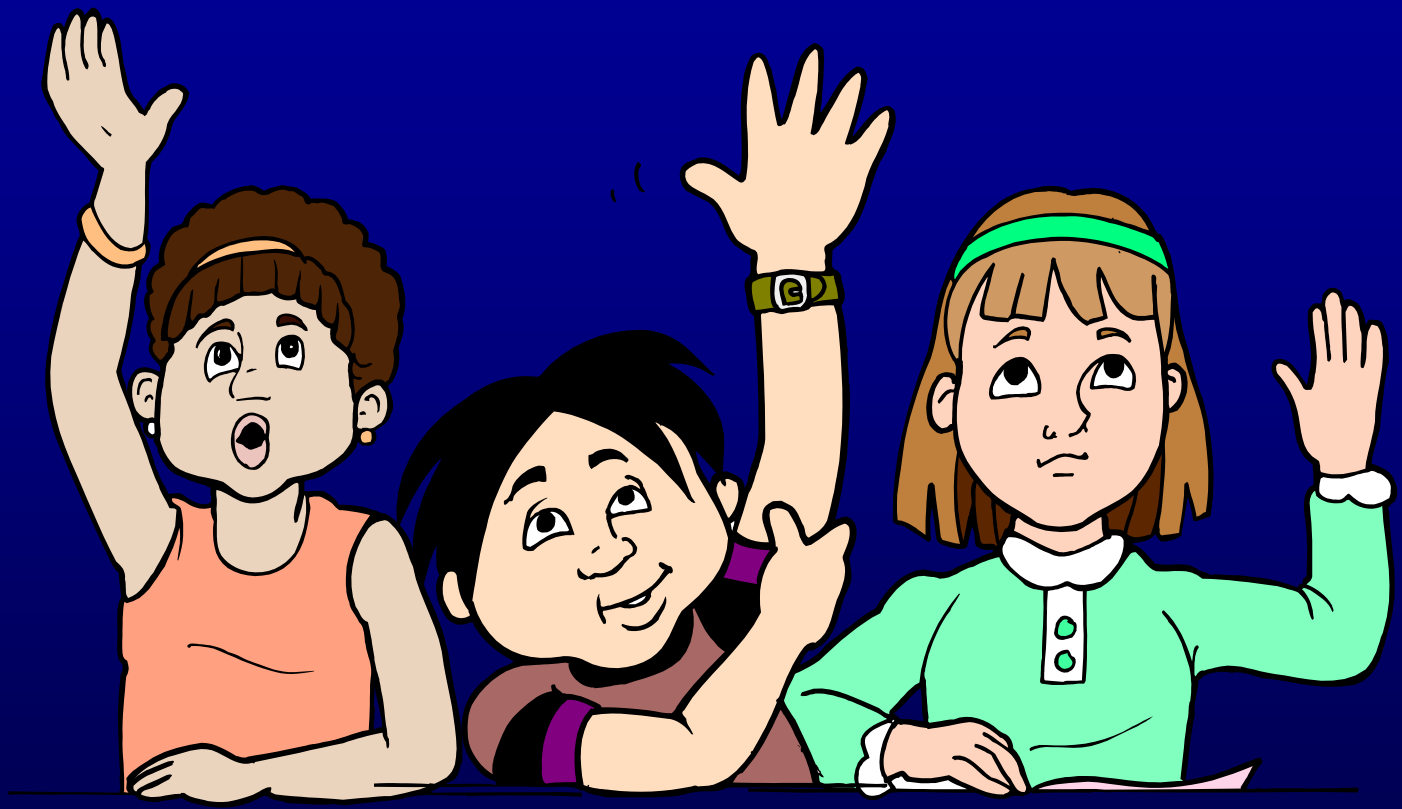
Where can I find information?

- Informal Sources:
  - Your professors
  - Academic advisor or college career center
  - Current grad students (email or web pages)
  - Friends who have gone to graduate school
  - Department web sites & university bulletins
  - Education resources on engineering professional society web sites (IEEE, ASME, ASCE, AIChE, IIE, AIAA, etc.)

World-Wide Web Resources

- Peterson's guides: *www.petersons.com*
- GradSchools.com: *www.gradschools.com*
- GradView: *www.gradview.com*
- American Society of Engineering Education (ASEE) *www.asee.org* – profiles of colleges/universities
- U.S. News & World Report annual rankings & articles *http://www.usnews.com/usnews/edu/grad/grhome.htm*
- GradNet (*www.gradnet.iec.org*)
- ACM Graduate Assistantship Directory (*info.acm.org/gad/*)
- Government agency & private foundation web sites (fellowship information)

Questions?



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