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Department Head Welcome Message

Welcome to the Department of Electrical Engineering and Computer Science (EECS). We are a relatively new department, formed on July 1, 2007, with the merger of the Computer Science Department and the Electrical and Computer Engineering Department, but, in fact, are a department with a long distinguished history from these earlier incarnations.

This is an exciting time for us with many changes for the existing programs and new opportunities for expanding our research program. In March 2012, the department celebrated its move into its new state-of-the-art facility, the Min H. Kao Building. The new building brings almost all of departmental activities under one roof.

EECS offers three academic programs: Electrical Engineering; Computer Engineering; and Computer Science. Each program provides graduate degrees at both the MS and PhD levels. We are a diverse department with research interests spanning numerous fields, including: analog electronics, artificial intelligence, bioinformatics, embedded systems, high performance computing, power and energy, visualization and image processing, and wireless and sensor networks. Please explore our department web pages to learn more about the research activities. It is critical for you as a graduate student to identify your area of interest early in your studies to take advantage of the available research opportunities.

We hope you are excited as we are about new directions for our programs and will enjoy the educational and research opportunities the department offers.

Dr. Leon Tolbert
Department Head
Introduction

Graduate School Introduction
“In order to serve the mission and vision of the Graduate School and preserve the integrity of Graduate Programs at the University of Tennessee, Knoxville, information related to the process of graduate education in each department is to be provided for all graduate students.”

Department Introduction
The EECS Department offers graduate programs leading to the Master of Science and Doctor of Philosophy with majors in Computer Engineering (CpE), Computer Science (CS) or Electrical Engineering (EE). Areas of research in these program majors include: Software Engineering; Electronic Devices and Analog/Mixed-Signal Circuits; Power Electronics; Antenna Design, Microwave Circuits and Micro-Electro-Mechanical Systems (MEMs); Energy and Power Infrastructure; High Performance Computing; Distributed Systems and Fault Tolerance; Networking; Computational Science and Engineering; Data Mining; Data Analytics and Visualization; Computer Graphics; Graphical User Interfaces; Information Systems; Signal and Image Processing; Intelligent Systems and Machine Learning; and Bioinformatics, Systems Biology and Biologically-Inspired Computing.

As a graduate student of the University of Tennessee, Knoxville and while pursuing the MS and/or PhD degree in the Computer Engineering, Computer Science or Electrical Engineering programs, you are considered an educated, responsible adult pursuing the frontiers of these expanding horizons. Look for opportunities beyond the required course work and take advantage of the learning opportunities we offer. Participate in professional groups and, if possible, technical conferences. In graduate school you have a relationship with faculty that is closer than before, and different - more like a colleague in learning and research. Your program will be more individualized, deeper, and less hurried. There will be chances to further develop your individual talents, be they basic research, analysis, synthesis, design, development, technical writing, or oral presentations. Research on the very frontiers of technology will be a major part of your program as you prepare a thesis or dissertation. There is also financial support available for graduate students through fellowships, teaching assistantships, and/or research assistantships.

The EECS Department along with the College of Business Administration also offers a dual MS-MBA degree program. Students must be admitted by both the EECS Department and the College of Business Administration. The majors within the EECS Department for which the dual MS-MBA degree program is available are Computer Engineering (CpE) and Electrical Engineering (EE).

This handbook is intended to help you gain as many benefits as possible from your studies and to make the most of the opportunities we have to offer. It contains information for how the Department and the Graduate School function, the range and selection of courses available, and what to do should difficult situations arise. Please note that this handbook is purely advisory and that the material it contains is not intended to be a comprehensive statement of University policy (always consult the University’s Graduate Catalog for procedures and requirements).

We know that it will become apparent to you that the staff, faculty, and you the student are all here for the same purpose: a successful learning experience leading to graduation with a MS or PhD degree that will foster a successful career in advanced Computer Science, Computer Engineering or Electrical Engineering. Your future begins today and we know that you also will feel the excitement, pride and deep satisfaction that will be yours in the EECS graduate program.
EECS Faculty

https://www.eecs.utk.edu/people/faculty/

**Dr. Mongi A. Abidi** – Image Processing, Robotics, Artificial Intelligence

**Dr. Itamar Arel** – Machine Learning, Artificial Intelligence, High Performance Custom Computing

**Dr. David Banks** – Display of Biomedical and Scientific Data, Interactive Simulation, 3D Rendering

**Dr. Micah Beck** – Parallel and Distributed Computing, Automatic Program Parallelization, Program Development Tools, Distributed and Fault Tolerant Systems

**Dr. Michael Berry** – Scientific Computing, Parallel Numerical Algorithms, Information Retrieval, Data Mining, Bioinformatics, Computational Science and Performance Evaluation, Visual Analytics

**Dr. Benjamin J. Blalock** – Analog/Mixed-Signal Integrated Circuit Design, SOI CMOS Analog/Mixed-Signal IC Design, Ultra Low Voltage CMOS IC Design, Programmable Analog Circuits

**Dr. Qing "Charles" Cao** – Networked Embedded Systems

**Dr. Daniel Costinett** (not pictured)- Power Electronics, Soft Switching Converters, Electric Vehicles

**Dr. Paul B. Crilly** – Digital Signal Processing, Digital Systems, Communications

**Dr. Judy Day** – Dynamical systems, Acute Inflammation/Immunology, Model Predictive Control, Translational Medicine, Transient Dynamics

**Dr. Mark Dean** - Advanced Computer Architectures - cognitive system devices, structures, architectures and learning models, non-Von Neumann data-centric computer architectures and programming models; Big Data Systems - deep Q/A systems, evidence based delivery of...
information and services; Computational Science - improved utilization of high performance computing to support scientific study and exploration

**Dr. Seddik M. Djouadi** – Systems and Control, Power Control in Wireless Networks, Stochastic Resonance

**Dr. Jack Dongarra** – Scientific Computing, Numerical Linear Algebra, Parallel Processing, Software Tools, Mathematical Software and Software Repositories

**Dr. Aly Fathy** – Electromagnetics, Antennas, Microwave Circuits, Propagation, UWB Systems

**Dr. Wei Gao** – Wireless networking, mobile systems, cyber-physical systems, social networks, pervasive and mobile computing.

**Dr. Jens Gregor** – Pattern and Image Analysis, Computed Imaging

**Dr. Gong Gu** – Electronic Devices based on Emerging Materials in the Interdisciplinary Junction of Physics, Materials Science, Electrical Engineering

**Dr. Jeremy Holleman** – Analog, RF, and Mixed-signal Integrated Circuit Design, Low-power System Design, Bio-medical Devices

**Dr. Jian Huang** – Visualization and Computer Graphics, Large Scale Distributed Visualization, Remote Visualization and Real Time Graphics

**Dr. Syed Islam** – Associate Department Head, Electronics

**Dr. Michael Jantz** – Virtual Machines, Operating Systems, Compilers, Program Optimization, Performance and Power Efficiency

**Dr. Michael A. Langston** – Combinatorial Algorithms, Computational Biology, High Performance Computing

**Dr. Fangxing "Fran" Li** – Power Systems Engineering and Economics

**Dr. Husheng Li** – Wireless Communications and Networks, Statistical Signal Processing, Information Theory, Theory of Random Matrices

**Dr. Yilu Liu** – Power Systems and Smart Grids

**Dr. Bruce Maclennan** – Neural Networks and Connectionism, Theory of Knowledge, Massively Parallel Analog Computation, Emergent Computation

**Dr. Donatello Materassi** – Stochastic Systems, System Identification and Modeling, Graphical Models, Cybernetics


**Dr. Audris Mockus** – Software Engineering, Data Science, Digital Archaeology

**Dr. Lynne E. Parker** – Associate Department Head, Distributed Mobile Robotics, Human-Robot Interaction, Distributed Intelligence, Sensor Networks, Machine Learning, Embedded Systems, Multi-Agent Systems

**Dr. Gregory Peterson** – Computer Engineering, Digital Systems

**Dr. James Plank** – Fault-Tolerance, Erasure Codes, Storage Systems, Distributed Computing, Operating Systems

**Dr. Hector Pulgar-Painemal** – Power System Dynamics and Stability, Power System Operation and Control, Renewable Energy Integration

**Dr. Hairong Qi** – Computer Engineering, Image Processing, Sensor Networks


**Dr. Jinyuan "Stella" Sun** – Security and Privacy in Wired/Wireless Networks and Critical Application Systems

**Dr. Kai Sun** – Power system stability, control and optimization

**Dr. Chao Tian** – Data Storage Systems, Information Theory, Data Communication and Networks, Signal Processing
Dr. Leon Tolbert – Power Electronics, Power Systems
Dr. Kevin Tomsovic – CTI Professor and Department Head, Power Systems, Optimization
Dr. Bradley Vander Zanden – Graphical Programming Environments, Programming Languages, Constraint Solving, Graphical User Interfaces
Dr. Michael D. Vose – Cross-Disciplinary Activities; Algorithms, Simulation, Theory
Dr. Fei "Fred" Wang – Power Electronics, Power Systems, Motor Drives, Electric Machines
Dr. Jayne Wu – Microelectronics, Microfluidics, MEM
Areas of Research

The University of Tennessee’s flagship campus in Knoxville boasts a vigorous research agenda engaging scholars and students with expertise in issues vital to local and global interests. The Knoxville campus is the hub of a vibrant research community that includes Oak Ridge National Laboratory and other University of Tennessee System campuses and institutes. EECS engineers and scientists are actively engaged in the following areas of research:

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<td>Abidi, Arel, Gregor, Huang, Qi, Vander Zanden, Vose</td>
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Biological Applications
Acute Inflammation/Immunology, Bioelectronics, Bioinformatics, Bio-Medical Devices, Biotechnology and Bio-Sensor Design, Computational and Systems Biology, Dynamical Systems, Model Predictive Control, Transient Dynamics, Translational Medicine

Affiliated Labs, Centers, Institutes
- Laboratory for Information Technologies, National Institute for Mathematical and Biological Synthesis (NIMBioS)

Affiliated Faculty
- Tenured/Tenure-Track: Michael Berry, Judy Day, Jeremy Holleman, Syed Islam, Michael Langston, Nicole McFarlane, Gregory Peterson, Michael Vose, Jayne Wu

Computer Systems and Architecture
Compilers, Distributed and Fault Tolerant Systems, Operating Systems, Power-Aware Computer Systems and Architectures, Program Development Tools, Storage

Affiliated Labs, Centers, Institutes
- Logistical Computing and Internetworking Laboratory (LoCI), Power-Aware Computer Systems Laboratory (PACS)

Affiliated Faculty
- Tenured/Tenure-Track: Micah Beck, Gregory Peterson, James Plank, Brad Vander Zanden, Xiaorui “Ray” Wang

High Performance and Scientific Computing
Distributed Computing, Mathematical Software and Software Repositories, Numerical Linear Algebra, Parallel Processing, Software Tools

Affiliated Labs, Centers, Institutes
- Innovative Computing Laboratory (ICL), Joint Institute for Computational Sciences (JICS)

Affiliated Faculty
- Tenured/Tenure-Track: Michael Berry, Jack Dongarra, Jens Gregor, Jian Huang, Michael Langston, Michael Vose
  Adjunct, Research, and ORNL Joint Faculty: Scott Klasky, Richard Mills

Intelligent Systems, Data Mining, and Machine Learning
Artificial Intelligence, Distributed Intelligence, Data Mining, Deep Machine Learning, Emergent Computation, Genetic Algorithms, Neural Networks and Connectionism, Pattern Recognition, Robotics, Visual Analytics

Affiliated Labs, Centers, Institutes
- Center for Intelligent Systems and Machine Learning; Emergent Computation Project; Imaging, Robotics, and Intelligent Systems (IRIS); Laboratory for Information Technologies; Machine Intelligence Lab & Networking Research Group

Affiliated Faculty
• **Tenured/Tenure-Track:** Mongi Abidi, Itamar Arel, Michael Berry, Jens Gregor, Bruce MacLennan, Lynne Parker, Hairong Qi, Michael Vose
  **Adjunct, Research, and ORNL Joint Faculty:** David Icove

**Microelectronics, Microwave, and MEMS**
*Analog Circuits, Antennas and Microwave, Bio-Electronics, Embedded Systems, Integrated Circuits, MEMS, Microelectronics, Mixed-signal VLSI, Nano-Electronics, Sensors*

**Affiliated Labs, Centers, Institutes**
- Analog VLSI and Devices Laboratory, Antennas and Microwave Systems, Integrated Circuits and Systems Laboratory (ICAS)

**Affiliated Faculty**
- **Tenured/Tenure-Track:** Benjamin Blalock, Aly Fathy, Gong Gu, Jeremy Holleman, Syed Islam, Nicole McFarlane, Jayne Wu
  **Adjunct, Research, and ORNL Joint Faculty:** Charles Britton, Ethan Farquhar

**Networked and Embedded Systems**

**Affiliated Labs, Centers, Institutes**
- Advanced Imaging and Collaborative Information Processing (AICIP), Distributed Intelligence Laboratory, Power-Aware Computer Systems Laboratory (PACS), Software Quality Research Lab (SQRL)

**Affiliated Faculty**
- **Tenured/Tenure-Track:** Micah Beck, Qing “Charles” Cao, Seddik Djouadi, Husheng Li, Lynne Parker, Hairong Qi, Jinyuan “Stella” Sun
  **Adjunct, Research, and ORNL Joint Faculty:** Benjamin Arazi, Stacy Prowell, Xiaorui “Ray” Wang

**Power Systems, Power Electronics, and Renewable Energy**
* Distributed Energy Conversion and Control, Electric Machines, Electric Vehicles (EVs), Hybrid Electric Vehicles (HEVs), Packaging and High Temperature Power Electronics, Plug-in Hybrid Electric Vehicles (PHEVs), Power Quality and Active Power Filters, Power Systems Engineering and Economics, Motor Drives, Smart Grid Technologies*

**Affiliated Labs, Centers, Institutes**
- Center for Ultra-wide-area Resilient Electric Energy Transmission Networks (CURENT); Center for Power Systems, Power Electronics, and Energy (Power Engineering Laboratory); Power Information Technology Laboratory

**Affiliated Faculty**
- **Tenured/Tenure-Track:** Fangxing “Fran” Li, Yilu Liu, Leon Tolbert, Kevin Tomsovic, Fei “Fred” Wang
  **Adjunct, Research, and ORNL Joint Faculty:** James Nutaro, Burak Ozpineci

**Signal Processing, Systems, and Controls**
Affiliated Labs, Centers, Institutes
- Laboratory for Information Technologies

Affiliated Faculty
- Tenured/Tenure-Track: Seddik Djouadi, Paul Crilly, Husheng Li

Visual Computing and Image Processing
3D Rendering, Computed Imaging, Computer Graphics, Display of Biomedical and Scientific Data, Graphical Programming Environments, Graphical User Interfaces, Interactive Simulation, Large Scale Distributed Visualization, Remote Visualization, Visualization

Affiliated Labs, Centers, Institutes
- Advanced Imaging and Collaborative Information Processing (AICIP); Imaging, Robotics, and Intelligent Systems (IRIS); Joint Institute for Computational Sciences (JICS); See Laboratory (Seelab)

Affiliated Faculty
- Tenured/Tenure-Track: Mongi Abidi, Itamar Arel, Jens Gregor, Jian Huang, Hairong Qi, Brad Vander Zanden, Michael Vose
  Adjunct, Research, and ORNL Joint Faculty: Andreas Koschan

Purpose of this Handbook
Graduate students are expected to be aware of and satisfy all regulations governing their work and study at the university. Students should be directed to the Graduate Catalog (http://catalog.utk.edu/index.php?catoid=19), to the Hilltopics student handbook (http://dos.utk.edu/files/Hilltopics2014-2015.pdf) and to the publications on the Appeals Procedure and the Graduate Assistant Handbook available on the Graduate School website (http://gradschool.utk.edu/GraduateCouncil/AcadPoli/appealprocedure.pdf)

EECS Graduate Program Administration

Dr. Aly Fathy
2014-15 Graduate Program Director
http://www.eecs.utk.edu/people/faculty/afathy/

Dr. Fei “Fred” Wang
2014-15 Graduate Committee Chair
http://www.eecs.utk.edu/people/faculty/fulltime/fwang9/main

2014-15 Graduate Admissions Committee
http://www.eecs.utk.edu/resources/portal/committee-assignments/

Dana L. Bryson
2015-16 EECS Graduate School Contact/Support Information
gradinfo@eecs.utk.edu

EECS Faculty/Staff and the Services They Provide:
The main Business Office of the department is located in the Min H. Kao Electrical Engineering and Computer Science Building, Suite 401, and serves as the focal point for undergraduate and graduate activities. The staff in this office has detailed knowledge of the day-to-day operations of the department and will be your initial point of contact if any difficulties arise. They provide office support for the faculty and help facilitate the graduate and undergraduate programs.

The faculty (who teach the classes and supervise graduate student research) and the staff (who provide the supporting services) are whom you might consider to be the permanent residents of the Min H. Kao Building. A semi-permanent population of graduate students, many of whom you will encounter in labs and occasionally in classes, also have places of work in the Min H. Kao Building and the Science and Engineering Research Facility (SERF).

You will receive most of your instruction from the department’s faculty. They are reasonable people and very interested in helping you, especially if they sense that you are a capable and serious student and doing all you can to help yourself. In addition to teaching responsibilities, the faculty is involved in research and the oversight of graduate student research programs. The specific interests of the faculty, listed above, can help you determine where to go for further information on a particular aspect of the fields of Computer Engineering (CpE), Computer Science (CS) or Electrical Engineering (EE).

The staff is responsible for the smooth, orderly, day-to-day operation of the department. The staff in main business office maintains advising files on all graduate students. These files contain semester grade reports, an academic history, other academic records, and comments from advisors where appropriate. Most forms and student information sheets are available in the main business office and can be returned there after completed and the appropriate signatures have been obtained. The staff in the business office is frequently in contact with the faculty and can act as a good communications link between you and them, arranging contacts convenient to both. The staff is also the principal source of information of a general nature concerning the department and they usually find themselves taking care of personal items that have been found, misplaced or lost in or near the Min H. Kao Building.

Another important component of the staff can be found in the Technical Services. EECS’ IT staff is located in the Min H. Kao Building, Suite 423, they make sure that all the laboratory and computer equipment is in working order, oversee use of the small machine shop in which students are able to build up the hardware needed for class projects, and operate a parts store from which you can purchase most of the electronic components needed for project assignments.
**Department and Program History**
The Department of Electrical Engineering and Computer Science was formed in 2007 out of a merger between the Computer Science and Electrical and Computer Engineering departments.

Though EECS is a relatively new, the long-established departments from which it was created have given it a rich heritage that can be traced back more than 120 years.

The electrical engineering was first added to the university’s curriculum in the late 19th century, around the same time incandescent lighting started illuminating campus. Dr. Charles Perkins, an associate professor of physics and electrical engineering, was the only faculty member teaching electrical engineering courses to a handful of students. In 1892, the university had its first electrical engineering bachelor’s student graduate, Sidney Albert Beyland.

By 1896, the program was gaining steam with 85 students pursuing electrical engineering degrees. The influx of students and the addition of new equipment expanded the university's electrical laboratory to its limits in Science Hall. The addition of Estabrook Hall to campus in 1899 made room for a new power plant in addition to experimental labs.

In 1907, electrical engineering became its own department. Perkins, who still served as electrical engineering’s only faculty member assumed the position of department head. He would also teach the department's first graduate course offerings in 1913.

In 1942, the United States’ entrance into World War II caused a significant drop in the number of students studying electrical engineering at UT. During the early years of the war, the electrical engineering department was instrumental in training members of the U.S. Army Air Corps. Following the war student numbers skyrocketed with veterans returning to earn degrees under the G.I. Bill. More than 300 undergraduates were enrolled in electrical engineering courses by 1947.

In the 1950s computers began appearing on college and university campuses across the country. Computers became a vital tool in research, speeding up the process of calculating complex equations and streamlining the storage of vast amounts of data.

Electrical engineering faculty members were at the forefront of the university’s new interest in computing science. In 1958, Department Head Paul Cromwell found a way to bring the first digital computer to campus – a Librascope General Purpose 30-bit. As computers became more prevalent, there became an increased in demand for courses in the field of computer science. At the time, however, computer science was still considered a field under electrical engineering and mathematics. Courses in programming and numerical methods were offered by the Mathematics Department, while courses on computers continued to be taught in the electrical engineering department.
In 1972, the department of Computer Science was created to offer a master's degree within the College of Liberal Arts. Approximately 150 students were enrolled in the master's program in the fall of 1972. In 1974, the Tennessee Higher Educational Commission approved the proposal for the addition of an undergraduate degree program to be added to the department, a Bachelor’s of Arts in Computer Science. The same year, Robert Gregory became the first department head for computer science.

During the late 1980s, UT's Computer Science department gained national recognition in networking and supercomputing. The first appearance of the PhD program in computer science was in the 1986-87 catalog. Professor Michael Thomason directed the first Ph.D. that was awarded to Robert England in 1989.

Throughout the next two decades, the Computer Science Department moved into the top ranks of the university’s departments in contract and grant funding per full-time equivalent faculty, earning two multi-year NSF Infrastructure Grants to support its work in parallel computation on multiple processors and grids of shared resources.

On July 1, 2007, the Computer Science Department officially merged with the Electrical and Computer Engineering Department becoming the Electrical Engineering and Computer Science Department.

In May 2007, construction began on a new building to house the newly merged department. This building was made possible through a $12.5 million gift from alumnus Min H. Kao, CEO and chairman of Garmin International. The six-floor, 150,000-square foot building became the home of the department in fall 2011.
General Duties & Responsibilities of Faculty & Grad Students

- Emphasis on full commitment to the program and participation in professional activities
- Repeated emphasis on the absolute necessity of satisfying university regulations in a timely fashion

Hilltopics Student Handbook (http://dos.utk.edu/files/Hilltopics2014-2015.pdf) – Each year the University of Tennessee produces the Hilltopics Student Handbook. Inside Hilltopics students will find general campus policies and procedures, standards of conduct, academic policies and procedures and information about student support, services and organizations.

Some Things to Do Your First Semester in Graduate School:
- Obtain an advisor (Go to the Min H. Kao Building, Suite 401, to obtain a temporary advisor)
- Obtain a UNIX account (See the university and departmental computer account sections below)
- Acquaint yourself with departmental requirements and course sequencing
- Register for next semester by phone (974-2101) or with Circle Park Online (CPO)
- Carry your ID at all times
- Pick up a student directory (usually available in October at the University Center)

Read the Graduate School publications and carefully read the Graduate Catalog’s introductions to the Graduate School and the EECS Department for procedures and requirement.

University Computer Accounts
In some courses you may be specifically directed to use one of the many computer systems available for student use on campus. Students can obtain their own personal account, known as a UNIX e-mail account, which will remain in effect as long as the student is registered at the University. To register for an account you need to contact OIT (Office of Information Technology).

EECS Department Computer Accounts
Many of the EECS computing resources are restricted to departmental faculty, staff and students. This restriction depends on EECS department computer accounts and should not be confused with University computer accounts.

Accounts for most students are created from class enrollment data. Accordingly, account information may be distributed during class at the beginning of each semester. Otherwise, students should see EECS IT Support in 423 Min H. Kao to obtain an account.

Using the Web to Register with Career Services
Students can register with Career Services (http://career.utk.edu/) for all things career-related. They provide career counseling, interviewing and resume advice, and updated information on career fairs and workshops. By registering with their HIRE-A-VOL system, you will gain access to job postings and other employment opportunities that include full/part time positions and internships. Students are encouraged to use Career Services and the many features they offer.
Admission Requirements and Application Procedure

The Graduate School - The University of Tennessee

- Admission to the program and through Graduate Admissions
- Special admission categories such as non-degree, conditional, probationary, or readmission

Admission Procedures Common to All Three Degrees (CS, CpE and EE)

- UT Undergraduate Students
- Transfer of Graduate Credits
- International Students
- Registration for Classes Each Term
- Part-Time Students
- Graduation Procedures Common to Both Degrees
- The Honor Code
- Appeals

The Graduate School is the complete contact for the applicant. All forms except recommendation letters and rating forms should be sent to the Graduate Admissions Office, not the department. The Graduate Admissions Office will consult the department and supply all information that is needed. It will also advise the applicant of any items missing from the application, the final decision on the application and procedures for registering after successful admission.

The Department requires test scores for the general GRE for all entering MS and PhD students. The TOEFL is required for all those whose native language is not English, regardless of their immigration status or whether they have attended a U.S. school. There are no required scores for the GRE; however, admission to EECS graduate programs is very competitive and the GRE score will account for only a part of the overall decision making process. Applicants whose native language is not English are required to take and pass the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS). Passing marks are 550, 213, 80, and 6.5 for paper-based, computer-based, internet-based (iBT) TOEFL, and IELTS respectively. Official scores must be received directly from the appropriate testing service. The University of Tennessee's score reporting code for TOEFL is 1843. The score must not be older than two years. Applicants who have received a degree from an accredited US institution in the past two years are exempt from the TOEFL or IELTS requirement.

The department requires “Graduate School Rating Forms” from at least three references who know the applicant, preferably at least one professor from each school attended and each supervisor in any recent employment. Have these sent directly to the department and have all other forms related to the application sent directly to the Graduate Admissions Office.

The Graduate School requires an official transcript from each institution of higher education attended in the United States and also requires a 2.7 overall or 3.0 in the senior year from undergraduate programs (in the U.S.) or a 3.0 from graduate programs (in the U.S.). Foreign degree holders must have earned a minimum of 3.0 on a 4.0 scale or other equivalent to a 'B'
average. For departmental grade requirements for admission, see the MS or PhD program
descriptions following this section.
Anyone wishing to transfer from another graduate program is subject to admission
requirements and deadlines for new students. The Graduate School sets requirements and limits
on transfer course credit (see the Graduate Catalog).

The Graduate School sets the deadlines for applications. For international students, the
deadlines are October 15 for the summer semester, February 1 for the fall semester and June 15
for the spring semester. For U.S. citizens there is no stated deadline and applications are often
accommodated near the beginning of each term.

**UT Undergraduate Students**

Read very carefully “UT Knoxville Seniors” in the first section of the Graduate Catalog, entitled
“the Graduate School”. The Graduate School is very firm on all details of this provision. The
department urges outstanding EECS seniors to get a jump-start on their Master’s degree, but be
sure to get the Graduate School’s approval in advance for such courses. Approval must be
obtained before graduate credit will be given for the registered course. If not, credit will not be
given toward the MS degree.

Since EECS seniors are already on campus, they may be eligible for assistantships earlier than
usual and once they enter the Master’s program. The student should see the department for
graduate teaching assistantships and professors in his/her research area for research
assistantships.

If the student does not have a BS in Computer Engineering, Computer Science or Electrical
Engineering, he/she would usually not be able to obtain a graduate assistantship until he/she
has completed the remedial undergraduate work required before entry into the MS degree
program.

**Transfer of Graduate Credits**

Read carefully “Transfer Credits” in the first section of the Graduate Catalog, entitled “the
Graduate School”. The Graduate School limits the amount of coursework transferable for
graduate degrees at the University of Tennessee, Knoxville. The EECS Department must
approve the content of any transfer courses. To expedite the approval process, provide a detailed
syllabus of each course proposed for transfer (to include the name of the textbook and other
pertinent course information) and send it with your application for admission to candidacy. A
general catalog description of a course is usually not sufficiently detailed.

**International Students**

Read carefully “Admission of International Students” in the first section of the Graduate
Catalog, entitled “the Graduate School”. The application deadlines given (about six months
before each semester) are firm and the Graduate School makes no exceptions. Applicants whose
native language is not English are required to take and pass the Test of English as a Foreign
Language (TOEFL) or the International English Language Testing System (IELTS) (see
Admission Requirements above). Experience shows that anyone with a low TOEFL score might
have some difficulty with English, and it is recommended that he/she work hard to improve
his/her English (especially spoken English) before entering the program.
Students should contact faculty with similar research interests to obtain graduate research assistantships or to get their recommendation for a department graduate teaching assistantship. International students who arrive on campus without pre-arranged assistantships will usually have to be on campus at least one or two semesters in the MS or PhD program(s) before a faculty member will provide sponsorship. No tuition waivers are available without an assistantship.

If an international student does not have a BS in Computer Engineering, Computer Science or Electrical Engineering, he/she must apply as an undergraduate student in one of the EECS BS degree programs. After completing the remedial undergraduate courses with at least a “B” average, he/she may apply to the MS program. In doing so, the requirements for the BS degree from this department might also be met.

Financial Support

- Graduate assistantships are the primary source of funding for graduate students at UT and are offered by academic departments and administrative offices of the university. An assistantship is a financial award to a graduate student for part-time work in teaching, administration, or research while pursuing an advanced degree. Appointments are normally on a one-fourth to one-half time basis, usually requiring 10 – 20 hours of service per week. The annual stipend is payable in either nine or twelve monthly installments. In addition to the stipend, Graduate Teaching Assistants (GTA), Graduate Teaching Associates (GTAssoc), Graduate Assistants (GA), and Graduate Research Assistants (GRA), with appointments on a one-fourth time basis or higher, are entitled to a waiver of maintenance fees and tuition for the period of appointment in accordance with university policy. These appointments also include a benefit of health insurance for the student. While there is no central point of contact for information on GA positions in administrative offices around the university, some positions are filled periodically in college advising centers, admission offices, residence halls, and other service offices.

- Fellowships: Fellowships are awards that typically require no service. Most fellowships are awarded on the basis of academic merit and potential for scholarship. (descriptions on the Graduate School website)

- Loans: administered by the Financial Aid office

- Employment: on-campus and off-campus; statements clarifying the number of hours a graduate student may work in on-campus jobs/assistantships and the departmental attitude toward outside employment

- Support for travel (policies and procedures) available from department/program, college, and university’s Graduate Student Travel Fund administered by the Graduate Student Senate (GSS).

A topic dear to all is financial support, and there is much more available for graduate students than for undergraduate students. Support for our graduate students comes in many forms, such as assistantships in the department as well as support from outside the department.

Departmental Assistantships
Graduate Teaching Assistantship (GTA)
One form of assistantship in the department is the Graduate Teaching Assistantship (GTA). Each GTA position currently pays tuition plus a monthly stipend. A Bachelor of Science in Computer Engineering, Computer Science or Electrical Engineering with at least a 3.5 GPA average is required. These are highly competitive, prestigious positions of responsibility, with office space, and facilities are provided accordingly. The department has approximately 75 graduate teaching assistantships that it awards each year. About one half of these are 20 hours/week assistantships (referred to as ½-time GTAs) and about one half of these are 10 hours/week assistantships (referred to as ¼-time GTAs). These assistantships are generally used as a recruiting tool to bring in outstanding prospective graduate students from around the world to the UTK EECS department. Almost all of the ¼-time GTAs also hold a ¼-time GRA (Graduate Research Assistantship) and work in conjunction with a faculty member. The GTAs generally help with the laboratories associated with undergraduate courses in Computer Engineering, Computer Science or Electrical Engineering. They also assist in grading homework and debugging computer programs. The GTAs should take course loads prescribed under “Policy for the Administration of Graduate Assistantships” in the Graduate catalog, and engage only in the assistantship and their degree program. Students should find a graduate advisor with similar research interests to act as a sponsor for their application to be a GTA. Applications are available in 401 Min H. Kao.

The Graduate School requires the ACTFL OPIc Test for GTAs whose first language is not English. Students who score less than “Advanced High” (AH) should retake these tests every semester until the score is AH or better. Students with scores lower than AH may have their GTA revoked and/or their activities regulated based on the test results. For complete details see “Policy for the Administration of Graduate Assistantships” in the Graduate School section of the Graduate Catalog. (The SPEAK® Testing Program was instituted at the University of Tennessee, Knoxville in 1983 as a response to a mandate from the Tennessee General Assembly requiring that all instructional personnel be proficient in spoken English. The program based the required levels of oral proficiency upon the ILR/ETS/ACTFL rating scale. The SPEAK® Test, created by ETS, has been retired, and the testing program now uses the ACTFL OPIc. The ITA Testing Program establishes the oral proficiency for teaching assistants and is located administratively in the Graduate School. All prospective teaching assistants or associates whose native language is not English are required to take and pass the OPIc before they can assume teaching responsibilities.) Please see the International Teaching Assistant (ITA) Testing Program webpage (http://gradschool.utk.edu/speaktest.shtml) for further information regarding testing dates/locations and other frequently asked questions.)

Graduate Research Assistantship (GRA)
Another form of assistantship in the Department is the Graduate Research Assistantship (GRA). At present, there are approximately 100 GRAs in the EECS Department. A GRA is paid through the University by a sponsor (government agency or company) to do research on a project. GRAs are chosen by the faculty principal investigator as positions become available. They are generally half-time appointments with paid tuition and fees, plus a monthly stipend appropriate to the student's level and the research project. A GRA is especially useful in the latter part of your program since the involved research usually provides an excellent thesis or dissertation topic and computer and laboratory facilities to conduct the research. Students should contact faculty who have similar research interests to inquire about the availability of these GRAs.

General Guidelines for Assistantships
Note that among the procedures and regulations of the Graduate School are some regarding assistantships. For example, the Graduate School requires that the course load of a half-time
assistant (GA or GRA) be 6 to 11 hours. The Graduate School limits the time for holding an assistantship to 3 years for a MS student and 5 years for a PhD student. The Graduate School requires the ACTFL OPIc Test for GTAs whose first language is not English, and regulates their activities based on the results. For complete details see “Policy for the Administration of Graduate Assistantships” in the Graduate Catalog.

**Fellowships**

The EECS Department provides several fellowships and assistantships for graduate students. The Bodenheimer Fellowship provides $10,000 per year per person to five superior EECS graduate students. This fellowship is combined with a graduate teaching assistantship (GTA) or graduate research assistantship (GRA) to bring the total value to more than $30,000. These fellowships were established by alumnus Michael Crabtree in honor of Professor Robert E. Bodenheimer who taught in the department for almost forty years prior to his retirement.

The Min Kao Fellowship also provides $10,000 per year per person and a tuition waiver to five superior EECS graduate students. This fellowship was established after UTK EECS alumnus Dr. Min Kao, CEO of Garmin International, Inc., donated $5 million to the department to establish fellowships, scholarships, and professorships.

The Ron Nutt Family Fellowship provides funding to an individual interested in studying medical imaging and data processing. Dr. Nutt is an alumnus of the department and a founder of CTI Molecular Imaging, Inc.

The College of Engineering Fellowship provides $10,000 per year per person to several students in the college. These are highly competitive fellowships, but a few EECS students receive these each year. Students should find a faculty sponsor to nominate them for one of these fellowships.

Other fellowships include the Dr. Vaughn Blalock Graduate Memorial Award, the Chancellor’s Honors Award, the ESPN Fellowship, the National Science Foundation (NSF) Award, the University of Tennessee, Graduate Fellowship Award and the Department Excellence Awards.

**Graduate Assistantship - System and Network Administrator**

We have a sizable support staff managing our labs and handling the UNIX system administration and other matters. We usually have four to six graduate assistants doing system admin work. Students who have good UNIX system/network admin skills can inquire about the availability of such GA positions. Interviews are usually necessary for these positions. The Division of Information Infrastructure (DII), formerly called the University of Tennessee Computing Center, has a variety of systems and network groups, many of which have GA positions. Obtaining a position with DII requires interviews and cannot be done remotely.

**Other Financial Support**

[http://gradschool.utk.edu/gradfund.shtml](http://gradschool.utk.edu/gradfund.shtml)

Other forms of support besides departmental assistantships include: fellowships outside the department, jobs on and off campus and loans. Our students have often found jobs at the Computing Center and Computer Store, as well as other academic departments (such as Biology, the Engineering Fundamentals Division, Psychology, Human Ecology and the Veterinary School) who need students with skills in computer engineering, computer science or electrical engineering in their research. The Graduate School has competitively awarded travel grants.
which provide partial reimbursement of expenses for graduate students to make scholarly presentations at professional meetings. (*However, during the present budget crunch, there will likely be no funds available from the Graduate School for travel*). Application deadlines for each term are in the preceding term. Sometimes research contracts are also able to help fund graduate research assistant’s travel to professional meetings. Students should work with their faculty advisor to write and submit papers for conferences. Most of the faculty will try to send students to domestic conferences if research contracts have sufficient funding.

The Graduate School identifies sources of support in its annual publication, “GradSources.” For computer science and engineering, the National Science Foundation and the department of Defense are particularly good sources. There are about fifteen different national-level guides on support for graduate students available for use in the reference room of the main Library. Notices of financial aid received by the department are posted for you on the various bulletin boards in Min H. Kao.

Most importantly, you should be active and early in pursuing the many sources of support that are open.

## Research Activities

The Computer Engineering (CpE), Computer Science (CS) and Electrical Engineering (EE) graduate programs contain considerable research for the purpose of providing a genuine experience in real frontier research in the area of the student’s interest. The EECS Department has more than $10 million worth of research contracts, making it very active in research and one of the most active at UTK. Graduate students should realize that the foremost reason for having this research is for their experience. Matching students to research is done carefully to meet our responsibilities to both the student and the sponsoring agency, who expects completely professional results. Also, this research is obtained in a competitive environment and we must deliver quality work to maintain our excellent position. You should invest some time early in your program in talking with faculty and other graduate students about their research. In some cases they will have publications or seminars from which you can learn. To become part of a research project you generally must be hired by the faculty member who is the Principal Investigator on that project. Openings occur throughout the year as projects start or students leave them.

### Responsible Conduct of Research (RCR) Institutional Plan

The University of Tennessee, Knoxville, takes its obligation to implement and support best practices in research seriously. The University of Tennessee’s Office of Research provides guidance and support for the implementation of training for Responsible Conduct of Research (RCR). In response to Section 7009 of the *America Creating Opportunities to Meaningfully Promote Excellence in Technology, Education, and Science (COMPETES) Act* (42 U.S.C. 18620–1) this RCR Institutional Plan has been developed to provide appropriate training and oversight in the responsible and ethical conduct of research. Responsible and ethical conduct of research is critical for excellence, as well as public trust, in science and engineering. Consequently, education in RCR is considered essential in the preparation of future scientists and engineers. **All EECS graduate students are required to complete RCR online training.** Information on guidelines and requirements, training
programs, forms, contact information and additional resources for this program can be obtained through the Office of Research (http://research.utk.edu/rcr/).

Registration and Advising

- Registration procedures and timelines
- Types of courses and course credit
- Minimum number of hours required for full-time status with and without assistantships
- Proper use of 502, use of facilities
- Proper use of 500 thesis and 600 dissertation hours
- Selection of advisor and/or advising committee and frequency of advising; expectations students should have of advisors or department

Registration for Classes Each Term

To register for classes each term, you will want to see the Graduate School for a “Timetable of Classes” and other instructions. This Timetable covers all undergraduate and graduate procedures and classes. It gives detailed instruction on how to register for each situation you might be in, as well as the times and locations of all classes. The normal procedure is to select classes via Web or telephone and pay by mail. These steps must be done well in advance, and if you are too late you must follow other procedures involving going to various campus fee offices.

Caution: be sure to register for each course for graduate credit, even if it has an undergraduate number. Only in this way can you count the course toward a graduate degree. The only courses that might be in this category in your program are math courses or some senior-level EECS courses.

Part-Time Students

It is practical to earn a Master’s degree as a part-time student if the student already has an acceptable BS in Computer Engineering, Computer Science or Electrical Engineering. Read carefully “Time Limit” in the first section of the Graduate Catalog, entitled “the Graduate School”. The student can register for evening courses as either a regular student or through the Evening School, but in all cases the Graduate School handles initial admission into the University.

If the student lacks a BS in Computer Engineering, Computer Science or Electrical Engineering, it is usually not practical to take undergraduate courses as a part-time student to become eligible for consideration in the MS program. This is because undergraduate courses are generally not available in the evenings and must be scheduled in proper sequence to satisfy prerequisite requirements.

It is usually not practical to pursue a PhD entirely as a part-time student (with exception of those with assistantships on campus), except perhaps for some coursework in the early stages. The part-time status is not generally compatible with the level of commitment and intensity of the program, especially in the qualifying examination participation, the dissertation research and the Graduate School’s residence requirement. However, anyone who is working at a research institution and highly qualified and motivated for the PhD should explore these possibilities with faculty in this department. A minimum recommendation is that his/her
employer should share the motivation and provide one of the letters of recommendation in support of the student’s application.

Degree Requirements Specific to the Department or Program

- Types of degrees: Master’s, Specialist, Doctoral
- Major concentrations or specializations
- Minors or cognates
- Research requirements for thesis/non-thesis options and for dissertation; research expectations such as requirement of publications prior to awarding of degree and requirement or expectation of participation in professional conferences
- Foreign language requirements
- Nature of courses to be taken
- Residency requirements
- Internship/practicum requirements; whether or not the department will assist in placement and conditions of completion for award of degree (include all information regarding requirements for internships/practicums)
- Preparation for licensing in the field
- Applicability of coursework taken outside the department or program
- Formation of thesis, non-thesis, and dissertation committees (emphasize specific process for requirements, committee meetings to approve coursework, and processes)
- Timetable for completion of degree

Computer Engineering Major, MS

Admission

Applicants for admission to the MS program for computer engineering are expected to have completed a bachelor's degree in electrical engineering or computer engineering with an average of at least 3.0 out of 4.0, both overall and in the senior year. Applicants are required to submit scores from the general Graduate Record Examination (GRE) within the past three years and to have these scores sent to the Office of Graduate Admissions. Applicants whose native language is not English, including those who have earned degrees at U.S. institutions, must have a minimum TOEFL score of 550 on the written exam or 80 on the Internet-based Test to be considered for admission to the program. The score must be no more than two years old from the requested date of entry. Applicants who have received a degree from an accredited U.S. institution within the past two years are exempt from the TOEFL requirement. Applicants who hold the bachelor's degree in other fields of engineering, computer science, mathematics, or the physical sciences are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. The department will require that selected undergraduate courses be taken as determined by the applicant's prior education and experience. The student will be admitted under non-degree status until the required undergraduate courses are
successfully completed with a 3.0 average. An international student may not enroll as a non-degree student.

Requirements

Students may choose between a thesis option, a non-thesis course-only option, and a non-thesis project option. All students must file a Master's Program Plan with the departmental graduate committee specifying which option they have selected, a semester-by-semester schedule of the courses they intend to take, and the members of the student's master's committee. Students may change between options one time by filing an amended Master's Program Plan and with approval of the departmental graduate committee. A student who receives financial support under a research assistantship is enrolled in the thesis option by default. Students who have held a research assistantship will require approval from the departmental graduate committee to change to one of the non-thesis options.

Thesis Option (30 hours)

Six semester hours of coursework, which may be any combination of mathematics at the 400-level* or above approved by the graduate committee, or courses in the department at the 500-level or above, or courses outside the department that have been approved by the student's master committee and the graduate committee. An additional 18 semester hours of 400-level* or above work in the department, with at least 6 hours selected from the following courses: ECE 551, ECE 553, ECE 554, ECE 555, ECE 556, COSC 530, ECE 571, ECE 572, ECE 651, ECE 653, ECE 655, ECE 657. A master's thesis (ECE 500), totaling 6 hours is required, as well as a final oral exam covering the thesis and related course work.

Non-Thesis Courses Only Option (30 hours)

Six semester hours of coursework, which may be any combination of mathematics at the 400-level* or above approved by the graduate committee, or courses in the department at the 500-level or above, or courses outside the department that have been approved by the student's master committee and the graduate committee. An additional 24 semester hours of 400-level* or above courses in the department with 18 of the hours at the 500-level or 600-level. Of the 18 hours required at the graduate level, at least 6 hours selected from the following courses: ECE 551, ECE 553, ECE 554, ECE 555, ECE 556, COSC 530, ECE 571, ECE 572, ECE 651, ECE 653, ECE 655, ECE 657. A final comprehensive written examination. Information concerning the examination is available in the departmental office.

Non-Thesis Project Option (30 hours)

Six semester hours of coursework, which may be any combination of mathematics at the 400-level* or above approved by the graduate committee, or courses in the department at the 500-level or above, or courses outside the department that have been approved by the student's master committee and the graduate committee. An additional 21 semester hours of 400-level* or above courses in the department, with 15 of the hours at the 500-level or 600-level. Of the 15 hours required at the graduate level, at least 6 hours selected from the following courses: ECE 551, ECE 553, ECE 554, ECE 555, ECE 556, COSC 530, ECE 571, ECE 572, ECE 651, ECE 653, ECE 655, ECE 657. ECE 501 (Project in Lieu of Thesis) with a minimum grade of B. This course will be administered by the student's master's committee. A written project proposal
describing what the student will do in the course must be submitted in advance for the student’s master’s committee approval. A written final report and oral presentation is required and one copy of the final draft must be submitted to the graduate committee. A final written and oral examination covering the project and related course work.

Note: *At least two thirds of the minimum required hours must be taken in courses numbered at or above the 500 level.

Computer Engineering Major, PhD

The PhD is offered with a major in computer engineering. Exceptional students holding the bachelor’s degree may be admitted to the doctoral program without first obtaining a master’s degree. Candidates holding the MS must satisfy requirements 2 through 7 below while candidates holding only the BS must satisfy requirements 1 through 7. Applicants are required to submit scores from the general Graduate Record Examination (GRE) within the past three years and to have these scores sent to the Office of Graduate Admissions. A TOEFL score of 550 on the written exam or 80 on the Internet-based Test is required for non-native speakers of English, including those who have earned degrees at U.S. institutions. The score must be no more than two years old from the requested date of entry. Applicants who have received a degree from an accredited U.S. institution within the past two years are exempt from the TOEFL requirement. Specific departmental requirements for the PhD include the following.

1. For doctoral program, a minimum of 72 hours, including both course and research credit hours, is required. For students holding only a BS degree, a minimum of 39 graduate course credit hours is required. Graduate course work excludes research and dissertation credit as well as seminar courses. The student's major professor, with the concurrence of the dissertation committee, will prepare a curriculum plan outlining precisely what courses will be taken. The course credit hours should satisfy the following conditions:

   a. Six semester hours of mathematics at the 400-level* or above, approved by the graduate committee; or 6 semester hours of courses in the department at the 500-level or above; or 6 hours of courses outside the department approved by the student’s dissertation committee and the graduate committee.

   b. An additional 18 semester hours must be taken in courses numbered at or above the 500 level. In addition, the student must satisfy requirements 2 through 7 below.

2. For students holding an MS degree in Electrical Engineering, Computer Engineering or Computer Science from the University of Tennessee will be required to take a minimum of 15
hours of graduate course credit, excluding research and dissertation credit or seminar courses. Other students will be required to take a minimum of 24 hours of graduate course credit. These course credit hours must include the following:

a. A minimum of 9 hours in the department of 600-level course work. At least 3 hours of this work must be in an area other than the student’s major area.

3. Satisfactory performance on a qualifying examination. The qualifying examination is prepared by the Electrical Engineering and Computer Science faculty and consists of a written examination covering courses required in the undergraduate curriculum. Information concerning the qualifying examination is available in the departmental office. A student needs to pass the qualifying examination before the end of their first year to remain in the program (the first year begins the first day of classes at UT).

4. Satisfactory performance on a comprehensive examination administered by the student’s committee. The exam results are reported to the graduate committee for approval and the exam is filed in the department. The comprehensive exam is given when the student is ready to apply for admission to candidacy. The comprehensive examination consists of both written and oral parts. The written part consists of a complete review of the literature in the student’s dissertation topic and a review of the major tools to be used in the dissertation work. The student’s committee may require additional written sections. The student must demonstrate a mastery of the dissertation area, ability to think analytically and creatively, skill in using academic resources, and ability to complete the dissertation satisfactorily. The oral part of the comprehensive examination consists primarily of a professional presentation of a proposal for dissertation work and its defense. The committee may cover additional topics in the oral part.

5. Participation in departmental seminars.


7. Successful public defense of the dissertation by the student. A minimum of 6 months must separate the comprehensive examination and the dissertation defense.

*Note: At least two thirds of the minimum required hours must be taken in courses numbered at or above the 500 level.

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**Computer Science Major, MS**

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**Admission**

Two semesters of calculus plus two additional semesters of college mathematics (e.g. linear algebra, differential equations, probability) and a course in formal languages, as well as in systems
programming, are required for admission. Applicants are required to submit scores from the general Graduate Record Examination (GRE) within the past three years and to have these scores sent to the Office of Graduate Admissions. Applicants whose native language is not English, including those who have earned degrees at U.S. institutions, must have a minimum TOEFL score of 550 on the written exam or 80 on the Internet-based Test to be considered for admission to the program. The score must be no more than two years old from the requested date of entry. Applicants who have received a degree from an accredited U.S. institution within the past two years are exempt from the TOEFL requirement. Applicants for admission to the MS program for computer science are expected to have completed a bachelor’s degree in computer science or computer engineering with an average of at least 3.0 out of 4.0, both overall and in the senior year. Applicants who hold the bachelor’s degree in other fields are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. The department will require that selected undergraduate courses be taken as determined by the applicant’s prior education and experience. The student will be admitted under non-degree status until the required undergraduate courses are successfully completed with a 3.0 average. An international student may not enroll as a non-degree student.

Requirements

Students may choose between a thesis option, a non-thesis course-only option, and a non-thesis project option. All students must file a Master’s Program Plan with the departmental graduate committee specifying which option they have selected, a semester-by-semester schedule of the courses they intend to take, and the members of the student’s master’s committee. Students may change between options one time by filing an amended Master’s Program Plan and with approval of the departmental graduate committee. A student who receives financial support under a research assistantship is enrolled in the thesis option by default. Students who have held a research assistantship will require approval from the departmental graduate committee to change to one of the non-thesis options.

Thesis Option (30 hours)

Students are required to complete COSC 530, COSC 560, and either COSC 580 or COSC 581. An additional 15 hours of 400-level or above work in the department, with at least 9 hours of 500-level or 600-level work. Graduate courses taken outside the department are sometimes allowed but must be approved by the student’s master committee and the graduate committee before enrollment. A master’s thesis, COSC 500, totaling 6 hours is required.

Non-Thesis Option (30 hours)

Students are required to complete COSC 530, COSC 560, and either COSC 580 or COSC 581. An additional 21 hours of 400-level or above work in the department, with at least 15 hours of 500-level or 600-level work. Graduate courses taken outside the department are sometimes allowed but must be approved by the student’s master committee and the graduate committee before enrollment. The student must take course work in an area to prepare for the non-thesis master’s examination. The student’s advisor must verify that an acceptable set of courses has been taken before the student may
schedule the examination. Information concerning the examination is available in the departmental office.

**Project in Lieu of Thesis Option (30 hours)**

Students are required to complete COSC 530, COSC 560, and either COSC 580 or COSC 581. An additional 18 hours of 400-level or above work in the department, with at least 12 hours of 500-level or 600-level work. Graduate courses taken outside the department are sometimes allowed but must be approved by the student's master committee and the graduate committee before enrollment. COSC 501 (Project in Lieu of Thesis) with a minimum grade of B is required. This course will be administered by the student’s master’s committee. A written project proposal describing what the student will do in the course must be submitted in advance for the student’s master’s committee approval. A written final report and oral presentation is required and one copy of the final draft must be submitted to the graduate committee.

**Computer Science Major, PhD**

**Admission**

The PhD is offered with a major in computer science. A student seeking admission to the PhD program is expected to meet the following requirements. The student should have three letters of recommendation sent directly to the department head from individuals capable of assessing the student's potential for advanced work in computer science (for example, college faculty or employers for whom the student has worked after earning a bachelor's degree). The department reserves the right to contact these individuals or other knowledgeable people if additional information is deemed necessary or desirable. Applicants are required to submit scores from the general Graduate Record Examination (GRE) within the past three years and to have these scores sent to the Office of Graduate Admissions. A TOEFL score of 550 on the written exam or 80 on the Internet-based Test is required for non-native speakers of English, including those who have earned degrees at U.S. institutions. The score must be no more than two years old from the requested date of entry. Applicants who have received a degree from an accredited U.S. institution within the past two years are exempt from the TOEFL requirement. Applicants should satisfy the same background requirements as for the computer science master’s program.

**Requirements**

A minimum of 72 hours, including both course and research hours, is required. Original research reported in a dissertation of high quality is emphasized. Doctoral (PhD) students holding an MS degree in Electrical Engineering, Computer Engineering or Computer Science from the University of Tennessee will be required to take a minimum of 15 hours of graduate course credit. Students pursuing the direct PhD degree will be required to take a minimum of 39 graduate hours.

All other PhD students will be required to take a minimum of 24 graduate hours. Graduate course work excludes research and dissertation hours as well as seminar courses. Courses COSC 530, COSC 560 and COSC 580 or COSC 581 passed with a grade of at least a B, are required for the degree. At least 6 hours of 600-level graded courses must be taken in computer science at the University of
Tennessee, Knoxville. The student's advisor and committee will establish the specific course requirements.

Satisfactory performance on a comprehensive examination administered by the student's committee. The exam results are reported to the graduate committee for approval and the exam is filed in the department. The comprehensive exam is given when the student is ready to apply for admission to candidacy. The comprehensive examination consists of both written and oral parts. The written part consists of a complete review of the literature in the student's dissertation topic and a proposed research plan for the dissertation work. The student's committee may require additional written sections. The student must demonstrate a mastery of the dissertation area, ability to think analytically and creatively, skill in using academic resources, and ability to complete the dissertation satisfactorily. The oral part of the comprehensive examination consists primarily of a professional presentation of a proposal for dissertation work and its defense. The committee may cover additional topics in the oral part.

Successful public defense of the dissertation. A minimum of 6 months must separate the comprehensive examination and the dissertation defense.

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**Electrical Engineering Major, MS**

**Admission**

Applicants for admission to the MS program for electrical engineering are expected to have completed a bachelor's degree in electrical engineering or computer engineering with an average of at least 3.0 out of 4.0, both overall and in the senior year. Applicants are required to submit scores from the general Graduate Record Examination (GRE) within the past three years and to have these scores sent to the Office of Graduate Admissions. Applicants whose native language is not English, including those who have earned degrees at U.S. institutions, must have a minimum TOEFL score of 550 on the written exam or 80 on the Internet-based Test to be considered for admission to the program. The score must be no more than two years old from the requested date of entry. Applicants who have received a degree from an accredited U.S. institution within the past two years are exempt from the TOEFL requirement. Applicants who hold the bachelor’s degree in other fields of engineering, computer science, mathematics, or the physical sciences are also expected to have a minimum cumulative grade-point average of 3.0 and a minimum senior year average of 3.0 in that field. The department will require that selected undergraduate courses be taken as determined by the applicant’s prior education and experience. The student will be admitted under non-degree status until the required undergraduate courses are successfully completed with a 3.0 average. An international student may not enroll as a non-degree student.

**Requirements**
Students may choose between a thesis option, a non-thesis course-only option, and a non-thesis project option. All students must file a Master’s Program Plan with the departmental graduate committee specifying which option they have selected, a semester-by-semester schedule of the courses they intend to take, and the members of the student’s master’s committee. Students may change between options one time by filing an amended Master's Program Plan and with approval of the departmental graduate committee. A student who receives financial support under a research assistantship is enrolled in the thesis option by default. Students who have held a research assistantship will require approval from the departmental graduate committee to change to one of the non-thesis options.

**Thesis Option (30 hours)**

Six semester hours of mathematics at the 400-level* or above, approved by the graduate committee; or 6 semester hours of Electrical and Computer Engineering courses at the 500-level or above; or 6 semester hours of non-Electrical and Computer Engineering courses approved by the student’s master committee and the graduate committee. An additional 18 semester hours of 400-level* or above work in electrical and computer engineering, with at least 6 hours of 500-level or 600-level work in each of two areas of electrical and computer engineering. A master’s thesis ([ECE 500](#)), totaling 6 hours is required, as well as a final oral exam covering the thesis and related course work.

**Non-Thesis Courses Only Option (30 hours)**

Six semester hours of mathematics at the 400-level* or above, approved by the graduate committee; or 6 semester hours of Electrical and Computer Engineering courses at the 500-level or above; or 6 semester hours of non-Electrical and Computer Engineering courses approved by the student’s master committee and the graduate committee. An additional 24 semester hours of 400-level* or above work in electrical engineering or computer engineering with 18 of the hours at the 500-level or 600-level. Of the 18 hours required at the graduate level, at least 6 must be in each of two areas of electrical and computer engineering and an additional 6 hours outside of the two areas. A final comprehensive written examination. Information concerning the examination is available in the departmental office.

**Non-Thesis Project Option (30 hours)**

Six semester hours of mathematics at the 400-level* or above, approved by the graduate committee; or 6 semester hours of Electrical and Computer Engineering courses at the 500-level or above; or 6 semester hours of non-Electrical and Computer Engineering courses approved by the student’s master committee and the graduate committee. An additional 21 semester hours of 400-level* or above work in electrical engineering or computer engineering, with 15 of the hours at the 500-level or 600-level. Of the 15 hours required at the graduate level, at least 6 must be in each of two areas of electrical and computer engineering and an additional 3 hours of work outside of the two areas. [ECE 501](#) (Project in Lieu of Thesis) with a minimum grade of B. This course will be administered by the student’s master’s committee. A written project proposal
describing what the student will do in the course must be submitted in advance for the student’s master’s committee approval. A written final report and oral presentation is required and one copy of the final draft must be submitted to the graduate committee. A final written and oral examination covering the project and related course work.

*Note: At least two thirds of the minimum required hours must be taken in courses numbered at or above the 500 level.

**Electrical Engineering Major, PhD**

The PhD is offered with a major in electrical engineering. Exceptional students holding the bachelor’s degree may be admitted to the doctoral program without first obtaining a master’s degree. Candidates holding the MS must satisfy requirements 2 through 7 below while candidates holding only the BS must satisfy requirements 1 through 7. Applicants are required to submit scores from the general Graduate Record Examination (GRE) within the past three years and to have these scores sent to the Office of Graduate Admissions. A TOEFL score of 550 on the written exam or 80 on the Internet-based Test is required for non-native speakers of English, including those who have earned degrees at U.S. institutions. The score must be no more than two years old from the requested date of entry. Applicants who have received a degree from an accredited U.S. institution within the past two years are exempt from the TOEFL requirement. Specific departmental requirements for the PhD include the following.

1. For doctoral program, a minimum of 72 hours, including both course and research credit hours, is required. For students holding only a BS degree, a minimum of 39 graduate course credit hours is required. Graduate course work excludes research and dissertation credit as well as seminar courses. The student’s major professor, with the concurrence of the dissertation committee, will prepare a curriculum plan outlining precisely what courses will be taken. The course credit hours should satisfy the following conditions:

   a. Six semester hours of mathematics at the 400-level* or above, approved by the graduate committee; or 6 semester hours of courses in the department at the 500-level or above; or 6 hours of courses outside the department approved by the student’s dissertation committee and the graduate committee.

   b. An additional 18 semester hours must be taken in courses numbered at or above the 500 level. In addition, the student must satisfy requirements 2 through 7 below.

2. For students holding an MS degree in Electrical Engineering, Computer Engineering or Computer Science from the University of Tennessee will be required to take a minimum of 15 hours of graduate course credit, excluding research and dissertation credit or seminar courses. Other students will be required to take a minimum of 24 hours of graduate course credit. These course credit hours must include a minimum of 9 hours in
the department of 600-level course work. At least 3 hours of this work must be in an area other than the student’s major area.

3. Satisfactory performance on a qualifying examination. The qualifying examination is prepared by the Electrical Engineering and Computer Science faculty and consists of a written examination covering courses required in the undergraduate curriculum. Information concerning the qualifying examination is available in the departmental office. A student needs to pass the qualifying examination before the end of their first year to remain in the program (the first year begins the first day of classes at UT).

4. Satisfactory performance on a comprehensive examination administered by the student's committee. The exam results are reported to the graduate committee for approval and the exam is filed in the department. The comprehensive exam is given when the student is ready to apply for admission to candidacy. The comprehensive examination consists of both written and oral parts. The written part consists of a complete review of the literature in the student's dissertation topic and a review of the major tools to be used in the dissertation work. The student's committee may require additional written sections. The student must demonstrate a mastery of the dissertation area, ability to think analytically and creatively, skill in using academic resources, and ability to complete the dissertation satisfactorily. The oral part of the comprehensive examination consists primarily of a professional presentation of a proposal for dissertation work and its defense. The committee may cover additional topics in the oral part.

5. Participation in departmental seminars.


7. Successful public defense of the dissertation by the student. A minimum of 6 months must separate the comprehensive examination and the dissertation defense.

NOTE: *At least two thirds of the minimum required hours must be taken in courses numbered at or above the 500 level.*

**Energy Science and Engineering Concentration**

This concentration is offered in collaboration with the Center for Interdisciplinary Research and Graduate Education (CIRE). The CIRE is a joint effort between the College of Engineering, other University of Tennessee colleges, and the Oak Ridge National Laboratory. The students who wish to pursue this concentration will normally have completed 6 Core credit hours, 3 credit hours of Knowledge Breadth, and 6 credit hours of Knowledge Specialization coursework (minimum 15 hours) specified under the [Energy Science and Engineering major](#), (PhD) program section of this catalog.
Five-Year BS / MS Program

The five-year BS/MS program is designed to allow qualifying students to take up to six hours of approved graduate courses for their senior undergraduate electives and have them count toward both their bachelor’s and master’s degrees at the University of Tennessee, thus reducing the amount of time it takes for a student to earn a master’s degree.

**Admission:** Students to be admitted to the program must have completed 96 hours of required course work with a minimum overall GPA of 3.4. Interested and qualified students need to fill out the Admission Form and return it to Julia Elkins at 401 in the Min H. Kao Building. The Admission Form needs to be approved by both the department chair and the Graduate School.

**Course Approval:** All courses taken for graduate credit must be approved by the departmental chair of the program. Admitted students need to fill out the Course Approval Form and return it to Julia Elkins at 401 Min H. Kao. This should be done by the beginning of the student’s last semester of their BS degree, at the latest. The Course Approval Form needs to be approved by both the department chair and the Dean at the College of Engineering. The courses will appear in DARS under “MASTERS PROG”. The signed Admission Form from Step 1 needs to be attached to the Course Approval Form when submitted to the College for approval.

**Senior Requesting Graduate Credit Petition:** Students admitted to the program must request permission from the Graduate School to take approved courses for graduate credit. Admitted students need to fill out the “Senior Requesting Graduate Credit Form” that can be downloaded at [http://gradschool.utk.edu/gradforms.shtml](http://gradschool.utk.edu/gradforms.shtml). Students need to return the signed form to Julia Elkins at 401 Min H. Kao.

**Applying to Graduate School:** Students admitted to the program must also follow the normal procedure for admission to Graduate School. Admission to the Five-Year BS/MS Program does not automatically admit them to Graduate School. For domestic students who plan to apply to our graduate program starting this coming fall, please be forewarned that a policy change by the Office of Graduate Admissions requires that we now ask that you **apply before June 1, 2015** and have all your documents in place shortly thereafter (including GRE scores, references, and an official transcript).

**Dual MS-MBA**

**Curriculum for Dual MS-MBA Program – Computer Engineering**

**Fall - First Year**

**Hours**

**Session 1:** 7 1/2 weeks  
ACCT 505 - Financial Accounting I 1.5  
MGT 506 - Competitive Strategy 1.5  
STAT 505 - Quantitative Methods 1.5  
MARK 505 - Marketing and Demand Management I 1.5  
BUAD 515 - Business Skills Development 1.5

**Session 2:** 7 1/2 weeks
Spring - First Year

Hours

1 Engineering Major course 3.0

Session 1: 7 1/2 weeks
MGT 505 - Leading Complex Organizations 1.5
SCM 505 - Supply Chain Management I: Strategic Issues in Supply Side Supply Chain Management 1.5
BZAN 505 - Operations Management 1.5
BZAN 506 - Prescriptive Modeling 1.5
BUAD 517 - Business Skills Development III 1.5

Session 2: 7 1/2 weeks
SCM 506 - Supply Chain Management II: Strategic Issues in Demand Side Supply Chain Management 1.5
FINC 506 - Financial Management II 1.5
BULW 505 - Foundations of Business Law and Ethics 1.5
ECON 506 - Market Forces in Global Environment 1.5
BUAD 518 - Innovation in Practice 1.5

Total spring hours 18.0

Summer - First Year

Hours

1 Electrical Engineering Major course / Mathematics course 6.0
Total summer hours 6.0

Fall - Second Year

Hours

1 Electrical Engineering Major courses 6-9
MBA Electives (Entrepreneurship and Innovation preferred) 6-9
Total fall hours 12-15

Spring - Second Year

Hours

1 Electrical Engineering Major courses / Mathematics courses 9.0
Total spring hours 9.0
Total hours required for dual program 60.0

1 The engineering courses selected must satisfy the degree requirements for the Electrical Engineering major.
**Curriculum for Dual MS-MBA Program – Computer Science**

**Fall - First Year**

**Hours**

**Session 1:**
- ACCT 505 - Financial Accounting I 1.5
- MGT 506 - Competitive Strategy 1.5
- STAT 505 - Quantitative Methods 1.5
- MARK 505 - Marketing and Demand Management I 1.5
- BUAD 515 - Business Skills Development 1.5

**Session 2:**
- ACCT 506 - Managerial Accounting I 1.5
- FINC 505 - Financial Management I 1.5
- MARK 506 - Marketing and Demand Management II 1.5
- ECON 505 - Economics of Strategy 1.5
- BUAD 516 - Business Skills Development II 1.5

Total fall hours 15.0

**Spring - First Year**

**Hours**

**Session 1:**
- Computer Science course 3.0

**Session 1:**
- MGT 505 - Leading Complex Organizations 1.5
- SCM 505 - Supply Chain Management I: Strategic Issues in Supply Side Supply Chain Management 1.5
- BZAN 505 - Operations Management 1.5
- BZAN 506 Prescriptive Modeling 1.5
- BUAD 517 - Business Skills Development III 1.5

**Session 2:**
- SCM 506 - Supply Chain Management II: Strategic Issues in Demand Side Supply Chain Management 1.5
- FINC 506 - Financial Management II 1.5
- BULW 505 - Foundations of Business Law and Ethics 1.5
- ECON 506 - Market Forces in Global Environment 1.5
- BUAD 518 - Innovation in Practice 1.5

Total spring hours 18.0

**Summer - First Year**

**Hours**

- Computer Science course(s) / Mathematics course(s) 6.0

Total summer hours 6.0

**Fall - Second Year**

**Hours**

- Computer Science courses 6-9
MBA Electives (Entrepreneurship and Innovation preferred)       6-9
Total fall hours 12-15

Spring - Second Year

Hours

1Computer Science courses 9.0
Total spring hours 9.0
Total hours required for dual program 60.0

1 The Computer Science courses taken for the dual MS-MBA degree must include Computer Science COSC 530, COSC 560, and either COSC 580 COSC 581.

Curriculum for Dual MS-MBA Program – Electrical Engineering

Fall - First Year

Hours

Session 1:          7 1/2 weeks
ACCT 505 - Financial Accounting I 1.5
MGT 506 - Competitive Strategy 1.5
STAT 505 - Quantitative Methods 1.5
MARK 505 - Marketing and Demand Management I 1.5
BUAD 515 - Business Skills Development 1.5

Session 2:          7 1/2 weeks
ACCT 506 - Managerial Accounting I 1.5
FINC 505 - Financial Management I 1.5
MARK 506 - Marketing and Demand Management II 1.5
ECON 505 - Economics of Strategy 1.5
BUAD 516 - Business Skills Development II 1.5
Total fall hours 15.0

Spring - First Year

Hours

1Engineering Major course 3.0

Session 1:          7 1/2 weeks
MGT 505 - Leading Complex Organizations 1.5
SCM 505 - Supply Chain Management I: Strategic Issues in Supply Side Supply Chain Management 1.5
BZAN 505 - Operations Management 1.5
BZAN 506 Prescriptive Modeling 1.5
BUAD 517 - Business Skills Development III 1.5

Session 2:          7 1/2 weeks
SCM 506 - Supply Chain Management II: Strategic Issues in Demand Side Supply Chain Management 1.5
FINC 506 - Financial Management II 1.5
BULW 505 - Foundations of Business Law and Ethics 1.5
ECON 506 - Market Forces in Global Environment 1.5
BUAD 518 - Innovation in Practice 1.5
Total spring hours 18.0

Summer - First Year

Hours

1 Electrical Engineering Major course / Mathematics course 6.0
Total summer hours 6.0

Fall - Second Year

Hours

1 Electrical Engineering Major courses 6-9
MBA Electives (Entrepreneurship and Innovation preferred) 6-9
Total fall hours 12-15

Spring - Second Year

Hours

1 Electrical Engineering Major courses / Mathematics courses 9.0
Total spring hours 9.0
Total hours required for dual program 60.0

1 The engineering courses selected must satisfy the degree requirements for the Electrical Engineering major.

Examinations

- Types and nature for master’s, specialist, and doctoral degrees: proficiency, diagnostic, qualifying, foreign language, comprehensive, defense of thesis/dissertation
- Administration procedure and grading
- Clear policy determined by department faculty vote on number of failures allowed before termination from program
- Termination process and communication with student including process of appeal within the department and route of appeal following department decision

Standards, Problems, and Appeals

- Required grade point average for continuation in program; results of failure of required coursework; academic triggers for dismissal (for example, two C’s in required coursework)
- Frequency of evaluation and other requirements for good standing; procedure for determining satisfactory progress (for instance, annual review by faculty committee)
- Procedure for removal of incompletes
• Adequate progress toward degree
• Compliance with legal requirements for research (departmental and university Institutional Review Boards (IRB))
• Terms of probation (e.g. if GPA falls below 3.0)
• Academic honesty: expectations, violations, penalties
• Conditions resulting in termination from the program
• Department appeals processes, including time limits for appeals
• University appeals procedure (http://gradschool.utk.edu)

**The Honor Code**
You are expected to adhere to the honor code in all matters, which is provided below:

“An essential feature of The University of Tennessee is a commitment to maintaining an atmosphere of intellectual integrity and academic honesty. As a student of the University, I pledge that I will neither knowingly give nor receive any inappropriate assistance in academic work, thus affirming my own personal commitment to honor and integrity.”

**Appeals**
Most graduate student grievances are resolved at the Departmental or College level. For appeals about academic matters, you should usually appeal first to the Departmental Graduate Committee. Further appeals would be directed to the faculty. For appeals about other matters, contact the Department Graduate Program Director or the Department Head.

If the appeal is not resolved at the Departmental level, you should confer with the Dean of Engineering and the Dean of the Graduate School. If that fails to resolve the matter, you may then initiate the Graduate Council appeal procedure. That will be heard by five faculty members drawn from the Graduate Council Appeals Committee. The outline of this procedure can be obtained from the Graduate School.

Ultimately, students have the right to appeal to the Provost and to the President of the University.

**Appendices**

**Pertinent Graduate Student Web Pages**

- Center for International Education http://web.utk.edu/~globe/index.php
- Counseling Center www.utk.edu/counselingcenter
- Department & College Funding, Fellowships, Assistantships for Grad Students http://gradschool.utk.edu/gradfund.shtml
- Graduate School http://gradschool.utk.edu
- Graduate Catalog http://catalog.utk.edu/index.php?catoid=19
- Graduate Student Appeals Procedure http://gradschool.utk.edu/GraduateCouncil/AcadPoli/appealprocedure.pdf
- Graduate Student Senate http://web.utk.edu/~gss
Forms and Additional Resources

Graduate Admissions Forms
The Graduate Admissions Forms must be submitted to the Office of Graduate Admissions (865-974-3251), located in 201 Student Services Building.

General Graduate Student Forms
- Change of Registration Form (Add/Drop Slip)
- Late Change of Registration Form PDF (175 KB)
- Senior Requesting Graduate Credit
- Completion of Certificate Program PDF (42 KB)
- Certification of Degree Completion Letter Request PDF (141 KB)
- Request for Time Extension Form (500 KB)
- Thesis/Dissertation Approval Form
- Request for Concurrent Master’s Degree Form PDF

Graduation Forms
All the forms are in interactive PDF. Refer to the instructions at the bottom. Always consult with your admissions specialist on your specific requirements.

Graduate student deadline dates

Master's Student Forms
- Admission to Candidacy Application* PDF (79 KB)
  - Candidacy Application FAQs
  - Revision to Master's and Ed.S. Candidacy Application PDF (56 KB)
- Graduation Application: found on MyUTK / "Student Records" / "Apply to Graduate"
• Report of Final Exam/Defense of Thesis (Pass/Fail) Form* PDF (34 KB)

Doctoral Student Forms
• Admission to Candidacy Application* PDF (43 KB)
  ○ Candidacy Application FAQs PDF (15 KB)
• Doctoral Committee Appointment Form* PDF (26 KB)
• Graduation Application: found on MyUTK / "Student Records" / "Apply to Graduate"
• Doctoral Language Exam Application and 2012-2013 Exam Schedule PDF (18 KB)
• Report of Final Exam/Defense of Dissertation (Pass/Fail) Form* - Committee Chair receives form from Graduation Specialist
• Scheduling Defense of Dissertation Form* PDF (21 KB)
• Survey of Earned Doctorates (SED) Web Registration. More about SED Registration.

All of these forms can be downloaded at http://gradschool.utk.edu/gradforms.shtml