

Computer Engineering (Ph.D.*)

[View PDF of Computer Engineering Admissions Checklist](#)

Prospective students should use this checklist to obtain specific admissions requirements on how to apply to Graduate School.

[View PDF version of the Computer Engineering catalog description](#)

Degree Offered:	Ph.D.
Director:	Dr. Yehia Massoud
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Faculty

Gregory A. Franklin, Assistant Professor (Electrical and Computer Engineering); Electric Utility Power Systems, Power System Protection and Control, Power Line Communication

M. R. Haider, Assistant Professor (Electrical and Computer Engineering); Analog, Mixed-signal, and RF Circuit and System Design, Low-power Electronics, Implantable Systems, Inductive Powering, Energy Harvesting, Impulse-based Wireless Communication

Thomas C. Jannett, Professor and Graduate Program Director (Electrical and Computer Engineering); Intelligent Control, Biomedical Instrumentation, Modeling and Simulation, Intelligent Sensor Networks

Yehia Massoud, Professor and Chair (Electrical and Computer Engineering); Electronic Design and Applications in Nanotechnology and Biotechnology

Murat M. Tanik, Professor (Electrical and Computer Engineering); Software Systems Engineering, Integrated Systems Design, Process Engineering

Gregg L. Vaughn, Professor (Electrical and Computer Engineering); Digital Signal Processing, Applications of Microprocessors, Digital Communication

See the graduate catalog of the University of Alabama at Huntsville (UAH) for the Electrical and Computer Engineering faculty of that university.

Program Information

The Ph.D. degree prepares students for professional and research careers in industry and academia. The Ph.D. in Computer Engineering is awarded by UAB and is offered through a

program shared with the University of Alabama in Huntsville (UAH), allowing both UAB and UAH to contribute to the program.

Admission Requirements

Requirements for admission to the Ph.D. program include the following:

1. A bachelor's degree in an accredited electrical or computer engineering program or a bachelor's degree in a related program acceptable to the graduate faculty in Electrical and Computer Engineering;
2. A score of at least 550 on the verbal and quantitative sections of the Graduate Record Examination (GRE);
3. An acceptable score on the TOEFL examination for international students whose native language is not English;
4. An overall GPA of at least 3.0 on a 4.0 point scale, or at least 3.0 for the last 60 semester hours completed; and
5. Three letters of evaluation concerning the applicant's previous academic and professional work.

Students not having a bachelor's degree in electrical or computer engineering may be required to complete prerequisite courses.

Financial Support

Fellowships and/or assistantships may be available for well-qualified students admitted into the PhD program. In order to be considered for financial aid for the coming academic year, the completed application materials must usually be received at UAB by April 1.

There are a number of minority fellowships available through the Graduate School. Contact the UAB Graduate School directly for further information.

Program Requirements

The course of study leading to the Ph.D. includes a minimum of 48 semester hours of course work beyond the bachelor's degree (excluding dissertation research). A student's advisory committee may allow appropriate course work pursued in completing a master's degree to be counted towards the 48 hour course work requirement, but a maximum of nine semester hours credit in thesis/research work from the master's degree may be allowed to count toward the 48 hour course work requirement for the Ph.D. Requirements include the following:

1. A major consisting of a minimum of 18 semester hours of approved coursework in

computer engineering;

2. A minor consisting of a minimum of 12 semester hours of approved coursework in mathematics, theoretical or formal methods as related to computer engineering;
3. A minor consisting of a minimum of 12 semester hours of approved coursework in electrical or computer engineering;
4. Additional coursework consisting of a minimum of 6 semester hours of approved coursework in supportive fields;
5. Successful completion of a preliminary examination;
6. Successful completion of a qualifying examination that includes a presentation of the dissertation research proposal. Successful completion of the qualifying examination leads to admission to candidacy;
7. Successful completion of a minimum of 18 semester hours in EE 799-Dissertation Research); and
8. Successful completion of a final examination on the dissertation.

Additional Information

Deadline for Entry Term(s):	Each semester
Deadline for All Application Materials to be in the Graduate School Office:	Six weeks before term begins
Number of Evaluation Forms Required:	Three
Entrance Tests	GRE (TOEFL and TWE also required for international applicants whose native language is not English.)
Graduate Catalog Description	http://main.uab.edu/show.asp?durki=95245

For detailed information, contact

Dr. Yehia Massoud, Graduate Program Director
UAB Department of Electrical and Computer Engineering. BEC 259D
1530 3rd Avenue South, Birmingham, Alabama 35294-1170.

Telephone 205-934-8440

E-mail ElecCompEng@uab.edu

Web www.eng.uab.edu

Course Descriptions

See the graduate catalog of the University of Alabama at Huntsville (UAH) for doctoral courses that university.

See the listing for the master's degree in electrical engineering (M.S.E.E.) for courses at the 500 level.

Unless otherwise noted, all courses are for 3 semester hours of credit. Course numbers preceded with an asterisk indicate courses that can be repeated for credit, with stated stipulations.

Electrical and Computer Engineering (EE)

601. Electrical and Computer Engineering Seminar. Research presentations delivered by faculty, students, and invited guests. Technical writing and development of verbal presentations. Writing a research paper. Maximum of 3 credit hours applicable toward the M.S.E.E. degree. Prerequisite: permission of instructor. 1-3 hours.

610. Technical Communication for Engineers. Workshop-oriented course producing technical memoranda, proposals, and conference and/or refereed-journal papers with oral presentations related to these work products. Prerequisite: Graduate standing in Engineering and successful performance on a written pretest.

621. Random Variables and Processes. Theory underlying analysis and design of communication, stochastic control, data gathering, and data analysis systems. Prerequisite: Coursework in communication systems or permission of instructor.

622. Advanced Communication Theory. Analysis of performance of analog modulation techniques in presence of noise. Prerequisites: Coursework in communication systems and random variables and processes.

624. Digital Communication. Design of digital communication systems. Prerequisites: Coursework in communication systems and random variables and processes.

625. Coding and Information Theory. Entropy, channels and channel capacity, RLL codes, error correcting codes, cyclic codes, cryptography, convolutional codes, trellis coded modulation. Prerequisite: Coursework in random variables and processes.

626. Digital Image Processing. Digital image processing fundamentals, image transformations, image enhancement, image restoration, image compression, image segmentation, and image presentation. Prerequisite: Coursework in systems analysis.

628. Telecommunications I. Advanced topics. Prerequisite: Permission of instructor.

629. **Telecommunications II.** Advanced topics. Prerequisite: Permission of instructor.

632. **Introduction to Computer Networking.** Computer networking fundamentals. Layered network model and correspondence to real systems. Discussion of Ethernet, token ring, TCP/IP LAN and other protocols. Exploration of Internet and similar systems. Network application models. Simulation of networks. Permission of instructor.

633. **Experiments in Computer Networking.** Detailed exploration of particular issues in network protocols and network application models. Development of series of programs to explore the details of network protocols and network application models. Prerequisite: Coursework in computer networking including TCP/IP protocols.

635. **Telecommunication Systems.** System organization and structure. Data transmission. Prerequisite: Permission of instructor.

636. **Advanced Digital Design.** Large-scale class project. Sample topics include math coprocessors, text coprocessors, CRT controllers, and data encryption devices. Prerequisite: Permission of instructor.

639. **Advanced Microprocessors.** Topics covering both hardware and software issues. Individual or group term project. Prerequisite: Permission of instructor.

640. **Object-Oriented Design.** Study and practice of the object-oriented methodology for developing software designs. Implementation consequences. Application of object-oriented methodologies to specific problems using object-oriented language. Prerequisite: Coursework in object-oriented programming.

641. **Modern Control I.** Discrete-time and sampled-data and systems. State variable models, state feedback and estimation. Optimal control and estimation. Predictive control.. Prerequisite: Coursework in control systems or permission of instructor.

642. **Intelligent Systems.** Organization and characteristics of intelligent systems. Optimization. Evolutionary algorithms. Neural network and fuzzy logic algorithms. Intelligent control. Prerequisite: Permission of instructor.

643. **System Identification and Adaptive Control.** Modeling of systems using structure identification, parameter estimation, and model validation. Controller design based on input-output models. Parameter adaptive control. Prerequisite: Permission of instructor.

650. **Software Engineering.** Introduces classical software lifecycles and software development paradigms. Provides state of the art practical experience in proposal development and software design. Develops integrated skills drawing experience from computer engineering, computer science, communication, systems engineering, and problem solving. Prerequisite: Permission of instructor.

651. **Software Engineering Large Systems I.** Introduces advanced integrated software systems

development paradigms. Notions of process and integrated system views. Modeling-in-the-large and modeling-in-the-small are discussed and related to levels in Object Oriented Design and programming. Prerequisite: Permission of instructor.

652. Software Engineering Large Systems II. Builds on the advanced integrated software systems development paradigms. Components are introduced as elements of large system implementations. In the context of a design taxonomy, advanced Object-Oriented design and development techniques are reviewed. Prerequisites: Permission of instructor.

657. Enterprise Information Architecture Engineering. Study and practice of the enterprise architecture engineering for developing multi-tiered enterprise level systems. Methodologies for design and implementation of large-scale information systems. Distributed computing, clients, servers, operating systems and databases. Prerequisite: Permission of instructor.

661. Advanced Electrical Machinery I. Synchronous machine theory. Prerequisites: Permission of instructor.

662. Advanced Electrical Machinery II. Induction machine theory. Prerequisite: Permission of instructor.

663. Control of Synchronous Machines. Methods for control of synchronous machines. Prerequisite: Permission of instructor.

671. Computer Applications in Power Systems. Analysis of power systems operation. Prerequisite: Permission of instructor.

672. Power System Overvoltages. Events causing overvoltages. System protection. Prerequisite: Permission of instructor.

673. Reliability of Power Systems. Component reliability using standard industrial techniques. Prerequisite: Permission of instructor.

674. Economic Operation and Control of Power Systems. Economic control of thermal generating stations and hydrothermal stations. Computer control of power systems. Prerequisite: Permission of instructor.

***690. Special Topics in (Area).** Prerequisite: Permission of instructor. 1-12 hours.

***691. Special Problems in (Area).** Prerequisite: Permission of instructor. 1-12 hours.

***697. Project.** Graduate project for Plan II Master's students. Prerequisite: Permission of instructor. 3 hours.

***698. Nonthesis Research.** Does not count towards a degree. 1-12 hours.

***699. Master's Thesis.** Master's thesis for Plan I Master's students. Prerequisite: Admission to

candidacy. 1-12 hours.

701. Electrical and Computer Engineering Seminar. Research presentations delivered by faculty, students, and invited guests. Technical writing and development of verbal presentations. Writing a research paper. Maximum of 3 credit hours applicable toward the Computer Engineering Ph.D. degree. Prerequisite: permission of instructor. 1-3 hours.

724. Digital Communications. Design of digital communications systems. Prerequisites: Coursework in communication systems and random variables and processes.

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773. Reliability of Power Systems. Component reliability using standard industrial techniques. Prerequisite: Permission of instructor.

774. Economic Operation and Control of Power Systems. Economic control of thermal generating stations and hydrothermal stations. Computer control of power systems. Prerequisite: Permission of instructor.

***790. Special Topics in (Area).** 1-12 hours.

***791. Individual Study in (Area).** 1-12 hours.

***798. Nondissertation Research.** Does not count towards a degree. 1-12 hours.

***799. Dissertation Research.** Prerequisite: Admission to candidacy. 1-12 hours.

Last modified 04/18/11