INFORMATION ON GRADUATE PROGRAMS IN
ELECTRICAL ENGINEERING AND COMPUTER ENGINEERING
(Revised 2009)

ADMISSION
Admission to the graduate programs of the College of Engineering is based on an individual assessment of the applicant's ability to successfully complete the program. Many factors, including undergraduate performance and relevant professional experience, enter into this assessment. Applicants who meet the minimum requirements, explained below, may still be denied admission if, in the opinion of the Department Graduate Committee, such denial is in the best interest of the applicant and/or the departmental graduate program.

MASTER OF SCIENCE DEGREE ADMISSION CRITERIA:
Applicants for either a Master of Science in Electrical Engineering or a Master of Science in Computer Engineering will be admitted on either a regular or qualified basis depending on their undergraduate G.P.A.s and background.

1. Regular Master’s admission requires a minimum 3.0 (C=2.0) G.P.A. with undergraduate degree in Electrical and/or Computer Engineering from an ABET (Accreditation Board for Engineering and Technology) accredited program.

2. Qualified Master’s admission requires a G.P.A. of at least 2.8 with an undergraduate degree in Electrical and/or Computer Engineering. Applicants are required to take certain ECE courses assigned by the Graduate advisor and to pass these courses with a "B" grade or better. These courses will be specified on the "ADMISSION ACTION" and may increase the credit hour requirements. On successful completion of the conditional program, applicants are granted regular status in the master’s program.

3. Student admitted to Regular Master’s program with any previous or current WSU financial support (GTA, GRA, and Rumble Fellow) must select the Plan A option, with eight-credit thesis.

4. All applicants whose BS degree is not from an ABET accredited university are required to submit other pertinent information including the results of the general test of Graduate Record Examination (GRE), publications, and/or inventions.

Non-ECE Undergraduate Majors
Qualified admission may be granted to applicants who do not have bachelor’s degrees in either Electrical or Computer Engineering but with undergraduate degrees from regionally accredited institutions in engineering, physics, chemistry, mathematics, and computer science who meet the equivalent of the above minimum standard. Students must take five prerequisite undergraduate courses as specified by the Graduate Advisor before they are permitted to take graduate courses. The prerequisite courses can not be taken by examination. Students must have a "B" grade or better in each of the five prerequisite courses. In some cases, prerequisite courses may be part of the program undertaken while holding Qualified Admission (this will be indicated on the "ADMISSIONS ACTION" and on the plan of work and will increase the credit hour requirements). These students must have their M.S. Program and prerequisites approved by the Department Graduate Committee.

Ph.D. ADMISSION CRITERIA:
Applicants are admitted on a regular basis depending on their Master’s G.P.A.s and background. Doctoral applicants must present higher entrance qualifications than those required for the master’s degree applicants. The same conditions relative to graduate from ABET-accredited institutions hold as specified for the Master’s degree, furthermore:

1. Regular Ph.D. admission requires a 3.6 G.P.A. or better with a Master’s degree in Electrical or Computer Engineering.

2. Post-master’s admission requires a 3.3 G.P.A. or better with a Master’s degree in Electrical or Computer Engineering. Applicants are required to take four ECE courses assigned by the Graduate advisor with a 3.6 G.P.A. or better and no grades below B. On the successful completion of the Post-Master’s program applicants may be granted regular admission to the Ph.D. program.

3. Applicant must have a master’s degree from another degree can be admitted on a regular basis if recommended and supervised by a Ph.D. advisor.

4. All applicants whose BS degree is not from an ABET accredited university are required to submit other pertinent information including the results of the general test of Graduate Record Examination (GRE), publications, and/or inventions.
CHANGE OF STATUS:
A change of status from the Master’s to the Ph.D. program is normally allowed only if the applicant has completed 24 or 32 credit requirements of the master’s degree. Exceptional students are allowed to go from Bachelor’s to the Ph.D. programs if recommended and supervised by a Ph.D. advisor.

ECE Combined BS/MS ‘A GRADE’ (Accelerated Graduate Enrollment) PROGRAM

AGRADE applicants must have:

1. Complete approximately 90 credit hours towards the undergraduate degree.
2. An overall Honor Point Average (HPA) of at least 3.4 in Engineering.
3. Not less than 3.6 honor point average in the department of specialization as computed by the rules of the Division of Engineering in the courses already completed.

GRADUATE NON-DEGREE ADMISSION:
A student who is entering the Graduate Division with objectives not related to the pursuit of a graduate degree may request admission on a non-degree basis. An Application for Graduate Admission must be filled, but a major is not recorded. The student may usually register for any course for which he/she is prepared. Qualified graduate applicants may apply for the following categories:

1. PRE-MASTER’S: For students with an acceptable grade point average and an earned bachelor’s degree from an accredited institution. Applicants must submit an Application for Graduate Admission and request official transcripts to be sent to the University Office for Graduate Admissions.
2. POST-MASTER’S: For students who hold an earned master’s degree. Students with Wayne State’s master’s degree should contact the Engineering Graduate Office. Others must submit a graduate application and transcripts to the University Office for Graduate Admissions.
3. POST-DOCTORAL: For those holding an earned doctoral degree.

A maximum of nine credit hours is normally permitted in the above classifications. Beyond that, registration as a non-degree student requires approval of the Engineering Graduate Office. Not more than nine credits, subject to the approval of the graduate officer, may be applied at a later date toward the residence and credit-hour requirements for either the master’s or Ph.D. degrees. If the student decides to seek admission to a graduate degree program, he/she should apply to the ECE department for a change of status before completing nine credit hours.

INTERNATIONAL STUDENTS:
Students from other countries desiring admission to the Graduate Division must contact the University Office for Graduate Admissions for material and deadline dates. To be considered for graduate admission, applicants must have completed an appropriate university-level program comparable in subject matter and credits to a program for which a bachelor’s degree is awarded at Wayne State University. All graduate applicants MUST (1) present an acceptable scholastic record (see section on admission); (2) make financial arrangements which allow for approximately $18,000 per academic year for tuition, supplies, living expenses, and medical insurance; (3) have a sufficient proficiency in the Test of English as a Foreign Language (TOEFL) to be able to study in classes conducted entirely in the English language (a minimum TOEFL score of).

The University Office of Graduate Admissions prefers results from the TOEFL. However, other standard examinations, which measure English proficiency, may be substituted if conditions prohibit taking the TOEFL. Any examination must be administered by qualified persons in American Consulates, USIS Offices, universities or binational centers.

Applications educated in countries where English is not native language and who are now permanent residents or U.S. citizens can be tested by the University’s Director of the English Language Institute. Procedures for such testing must be initiated through the University Office for Graduate Admissions.

FINANCIAL ASSISTANCE:
Although financial assistance for graduate students is limited, the department currently awards approximately 20 Graduate Teaching Assistantships. Furthermore, research funding in the department allows individual professors to award Graduate Research Assistantships.
MASTER’S DEGREE PROGRAMS
After receiving his/her credentials from the University Office of Graduate Admissions, and before registration, the student should contact the graduate advisor for details of program planning and to discuss course requirements and work. A preliminary plan of work must be prepared at this time in accordance with the master's degree requirement work-sheet.
A master’s thesis may be elected by those students wishing to pursue independent research. An oral presentation must be delivered upon completion of the thesis.

Graduate Courses
Graduate work is classified either as course work, in which students meet as a group, or as research. A student registered for eight or more credits is considered full time.

Direct Study
Directed study may be authorized provided the area of interest for the study is an integral part of the student’s graduate program and is not covered by courses available while he/she is completing the degree requirements. Normally, no credits of ECE 5990 and no credits of ECE 7990 are allowed in the master’s program without a thesis. Before master's student can register in direct study (or research), he/she must prepare an outline of the study and obtain the approval of the advisor, and the Departmental Chair; Ph.D. students must obtain the permission of the Dean of the Graduate School.

English Proficiency
It is expected that all graduate students should be able to write at a level of English surpassing that of an undergraduate student. Therefore, all papers and examinations will be graded on the basis of content and use of the English language.

Grades and Probation
No less than a B average overall (3.0) is required for graduation. Also, a B average must be attained in all ECE courses attempted. A C grade in a core course must be repeated. No more than two courses repeats are allowed in the master’s program. A student is put on probation if two C grades are received or if his/her Honor Point Average (H.P.A.) falls below 3.0. Probation student will be permitted the next eight credits to restore their cumulative H.P.A. to at least a 3.0; failure to do so will result in immediate termination from the program. A grade below C means termination from the program.

Plan of Work
A Plan of Work must be completed, signed by the Graduate Advisor; and placed in the student’s folder on or before the student has accumulated eight credits, but before he/she is permitted to register for additional courses. Approval of the Plan of Work advances the M.S. Student from “applicant” status to that of “candidate”.

Candidacy
Candidacy is an advanced rank, which is recommended by the departmental advisor and authorized by the Engineering Graduate Officer upon evidence of the applicant’s superior scholarship, appropriate personal qualities and promise of the professional competence. The applicant must exercise primary responsibility for advancing his rank to candidate. The student must have completed the specified prerequisites and have filed his Plan of Work. Approval of candidacy is a necessary but not sufficient requirement for a graduate degree.

MASTER’S DEGREE REQUIREMENTS – TOTAL 32 CREDIT HOURS (MINIMUM)
NOTE: unless otherwise stated, the following courses are 4 credit hours.

The Master of Science degree in Electrical or Computer Engineering is offered under the following options:

Master’s Degree Requirements – Total 32 Degree Credit hours (minimum)
The Master of Science degree in Electrical or Computer Engineering is offered under the following options:

Plan A: Thesis Option
- ECE8999 – 8 Cr Hrs
- Four courses in the major, at least one 7000 level courses – 16 Cr Hrs (B- or better)
- Any ECE graduate course and may include 4 Cr Hrs of ECE5990 (directed study) – 4 Cr Hrs
Any graduate course (except CSC5050) from any Engineering or Science Departments at WSU or transferred from any ABET accredited institution with grade of B or better – 4 Cr Hrs

Plan C: Course work only Option

- Five courses in major area, at least two 7000 level courses – 20 Cr Hrs (B- or better)
- One course must be from ECE Mathematics list – 4 Cr hrs
- Any ECE graduate course (except ECE5990) – 4 Cr Hrs
- Any graduate course (except CSC5050) from pre-approved Engineering or Science Departments at WSU or transferred from any ABET accredited institution with grade of B or better – 4 Cr Hrs

The department will only permit one course to be repeated. Students whose GPA fall below 3.0 must bring up their GPA to 3.0 within the next two semesters. Failure to do so can result in termination from the program. Overall 3.0 GPA in all the graduate courses taken at WSU is required for graduation. And that any university supported student must follow Plan A only.

**ECE Mathematics:** ECE5020, 5040, and 7030

**Computer Systems & Applications**

- **7000/8000 level courses:** ECE7120, 7530, 7610, 7660, 7670, 7680, 7690, 7995, and 8120.
- **5000/6000 level courses:** ECE5120, 5610, 5620, 563(2), 5640, 5650, 5670, 5680, 5690, 6600, 6640, 6660

**Electrical Systems**

- **7000 level course:** ECE7030, 7100, 7120, 7160, 7420, 7430, 7440, 7450, 7460, 7480, 7680, 7690, 7700, 7850
- **5000/6000 level courses:** ECE5120, 5170, 5370, 5380, 5410, 5420, 5430, 5440, 5470, 5480(2), 5690, 5700, 5770, 5870, 6100, 6180, 6690

**Electrical Devices**

- **7000/8000 level course:** ECE7030, 7530, 7540, 7560, 7570, 7680, 7830, 7850, 8550, 8570(1)
- **5000/6000 level courses:** ECE5500, 5510(2), 5550, 5690, 5870, 6550, 6570, and 6660

**ECE AGRADE PROGRAM 32 Credit Hour Plan of Work:**

Up to 12 Credit Hours out of the 134-credit BSEE requirement represent the AGRADE portion of the AGRADE undergraduate BS curriculum:

- **ECE5002 (4 Cr. Hr)*** Special AGRADE section – to replace another ECE 4000-level course.
- **8 Cr. Hr. elective** - Additional two 5000 or higher –level courses selected from the student chosen ECE MS Core Curriculum.

*Other 5000 level course may be used with Advisor’s approval

**Minimum 20 Credit Hours MS Graduate component in addition to 136 credit BSEE requirement.**

- **8 Cr. Hr.** - Two 7000-level ECE courses selected from the student chosen MS ECE Core Curriculum.
- **12 Cr. Hr.** - Three 5000-level or higher ECE courses selected in consultation and with the approval of the AGRADE Faculty Advisor.

**STUDENT ADVISING**

Each graduate student enrolled in ECE will have a faculty advisor. New students should meet with the graduate advisor to choose their faculty advisor. Each faculty member had posted office hours. A student’s faculty advisor will generally be the only faculty member signing registration forms, plans of work, etc. for them. Due to this, student should be prepared to complete all paper work for the next semester in a timely manner.
DOCTORAL OF PHILOSOPHY

The general purpose of the Ph.D. program is to provide an educational experience, which will enable its graduates to develop new knowledge in the discipline. Thus, research training is an important component of each student’s program. The faculty of the department recognizes that for engineering research to be relevant to the solution of problems encountered by those engaged in professional practices, a broad background in the profession is essential. Thus, an acceptable level of competence in each of the major areas of the discipline is a requirement of the program.

It is important for students entering the Ph.D. program to become familiar with the research interests of all the faculty as soon as possible. This allows a better match between student and faculty advisor in terms of selecting a research area and appropriate research assistantships and fellowships, particularly for sponsored research programs.

Credit-Hour Requirements

A minimum total of 90 semester credit hours beyond the bachelor’s degree is required, including at least 30 hours of 700-800 level courses and 30 hours of dissertation credit. At least 30 hours must be elected at Wayne State University. At the discretion of the advisor, up to 30 credit hours may be transferred from the Master’s program. At least one minor composed of eight or more credits must be elected from another core area or department, but in a related field.

Direct Study

Twelve credits of ECE 7990 are normally allowed in the Ph.D. program. The student must have the proper forms signed before registering for directed study. Before a student can register in directed study (or research), he/she must prepare an outline of the study and obtain the approval of the advisor, the departmental chair, the Engineering Graduate Officer, and the Dean of the Graduate School.

Plan of Work

The Doctor of Philosophy Plan of Work approved by the advisor and the departmental graduate committee chairperson should be submitted to the Graduate School for approval before the student has completed forty graduate credits (this includes the Master’s degree work). Any subsequent changes in the Plan of Work must be approved by the advisor and submitted to the Graduate School for approval.

Ph.D. Examinations

There are two Electrical and Computer Engineering Ph.D. Examination, they are:

A. The Ph.D. Preliminary Examination

The purpose of this examination is to determine whether a student is well prepared for the pursuing Ph.D. study in the Department of Electrical & Computer Engineering. Specifically, the purpose of this written preliminary examination is to determine if the student has sufficient background knowledge in basic general areas of electrical and computer engineering. The examination consists of three areas chosen from the approved list. One of the three area exams should be in the area in which the student plans to do a dissertation. A student should attempt the written preliminary examination within the first two semesters (not including the Spring/Summer semester) enrolled as a Ph.D. student. An extension may be arranged in exceptional circumstances during the first year of residence in the Ph.D. program. Each student is encouraged to consult his/her PhD advisor or the Graduate Committee Chair regarding the preliminary exam.

B. Ph.D. Qualifying Examination

All students must pass the qualifying examination before earning 64 credits toward the Ph.D. degree. As soon as possible after passing the preliminary examination, student should find a dissertation advisor, and
under the advisor’s direction, choose a dissertation topic and form a dissertation committee. It is the responsibility of the student’s dissertation committee to give the Ph.D. qualifying examination.

The Ph.D. qualifying examination consists of written and an oral part.

Written part: the purpose of this part of the exam is to test the student’s comprehensive background in the chosen dissertation area. The student will prepare a comprehensive report consisting of background (theoretical and/or experimental), literature survey, definition of the problem, and description of the proposed research. The report must also address any other issues related to the student’s major and minor area that the dissertation committee deems appropriate. This report will be presented to the student’s dissertation committee and serve as a written part of the qualifying examination. This is meant to be writing experience as well as a technical experience. In addition to the technical content, the dissertation committee will evaluate the report for its organization, clarity, and conciseness. The department graduate committee will be notified of the outcome of the written part. If the dissertation committee does not recommend that the student proceed to the oral part, the graduate committee will require that the student redo the written part. The resubmission of the written part to the dissertation committee must be down within one semester of the first attempt.

Within the time period specified by the Graduate school following successful completion of the Written Ph.D. qualifying examination as specific above, the applicant must pass the Oral Ph.D. qualifying examination.

Oral part: The purpose of this part of the exam is to test the student’s comprehensive background in the chosen dissertation area and to give the student the opportunity to defend the written part of the exam. The oral exam will be conducted by the dissertation committee and a graduate examiner appointed by the Graduate School. At this examination the applicant is expected to present in detail the proposed dissertation topic and to be prepared to show that all necessary preparation has been done to maximize the likelihood of successful scholarly contribution in the proposed area of research. Upon successfully passing oral examination the student will become Ph.D. Candidate by completing the Ph.D. Candidacy form and submitting to graduate school.

Information on the oral and written required examinations, as well as other requirements, are outlined in the HANDBOOK FOR DOCTORAL STUDENTS AND ADVISORS available in Graduate School website in this link:


Areas of Research
Bioengineering and Bioelectromagnetics  Neural Networks (Soft Computing)
Computer Engineering  Optical Engineering
Control Theory  Power Systems
Information and Communication Theory  Software Engineering
Networks and Computer-Aided Design  Solid State Devices
Parallel and Distributed Systems  Smart Sensors and VLSI

Ph.D. Degree Requirements
1. Seminar Requirement  (ECE9997 Doctoral Seminar cr. 1). Must complete two ECE9997 seminar courses.
2. Ph.D. Preliminary Exam: Must be taken within the first year (w/MS in ECE), in 2nd year (w/BS or MS non ECE)
3. Student must find research advisor within 2 semesters after passing Preliminary Exam
   Ph.D. Thesis Advisor Agreement must be in ECE office (good for one year).
   If agreement termination occurs, student has only one chance to find another advisor within 2
   semesters of termination with the first advisor.
4. Once 1, 2 and 3 are satisfied student are declared Ph.D. Candidate, by completing the Ph.D. Candidacy Status form to the Graduate School.
5. Can now register for ECE9991, 2, 3, 4 thesis credits (30 total hrs)
6. Ph.D. Qualifying Exam (Prospectus Exam)
7. Final Oral exam- (thesis defense)
**FACULTY SPECIALIZATIONS**

**Gregory Auner**, Professor (313-577-3904; e-mail: gauner@eng.wayne.edu) is interested in wide bandgap semiconductors, graded pyroelectric materials, magnetic materials for sensors and device development, smart sensors.

**Ivan Avrutsky**, Associate Professor (313-577-4801; e-mail: avrutsky@ece.eng.wayne.edu) is interested in optoelectronics, theory and technology of optical waveguides and gratings, fiber and integrated optics, optics of nanostructures, semiconductor lasers.

**Amar S. Basu**, Assistant Professor (313-577-3990; email: abasu@ece.eng.wayne.edu) Research areas: Microfluidics, bioMEMS, bionanotechnology, and scanning probes for medical applications.

**Ming-Cheng Mark Cheng**, Assistant Professor (313-577-5462; email: mcheng@ece.eng.wayne.edu) Research areas: BioMEMS, Nanotechnology, Nanomedicine.

**Robert Erlandson**, Professor, (313-577-3990; e-mail: rerlands@eng.wayne.edu) works on systems methodologies suitable for analysis and evaluation of large complex systems, particularly physiological structures; development of decision-making methodologies utilizing multivalued logic and nonparametric techniques.

**Xiaoyan Han**, Professor, (313-577-3646; e-mail: xhan@eng.wayne.edu) Research areas: infrared imaging, nondestructive evaluations.

**Mohamad Hassoun**, Professor (313-577-3966; e-mail: hassoun@brain.eng.wayne.edu) research interest includes artificial neural systems; associative memories; machine learning; pattern recognition; application of artificial neural networks to physiologic signal processing, optimization, and control.

**Song Jiang**, Assistant Professor, (313-577-8944; email: sjiang@eng.wayne.edu) Research areas: operating system, file and storage system, and high-performance computing.

**Feng Lin**, Professor, (313-577-3428; e-mail: flin@eng.wayne.edu) has a background in systems and control, hierarchical structure of discrete event systems, decision analysis for complex processes, control and optimization of flexible manufacturing systems.

**John Liu**, Associate Professor, (313-577-3428; email: jliu@eng.wayne.edu)

**Syed M. Mahmud**, Associate Professor, (313-577-3855; e-mail: smahmud@eng.wayne.edu) has been working in the area of microprocessor-based systems design, digital system design, special purpose computer architectures, cache-based multiprocessor system design and performance analysis.

**Abhilash Pandya**, Assistant Professor, (313-577-9921; e-mail: apandya@eng.wayne.edu) Research areas: Medical, NASA and Military Robotics, Image Guided Surgery, Biosensors, Augmented Reality, Virtual Reality, Image Processing.

**Nabil J. Sarhan**, Professor (313-577-7526, e-mail: nabil@ece.eng.wayne.edu) is interested in multimedia systems, multimedia networking, storage subsystems, multiprocessor systems, computer architecture, performance evaluation.

**Harpreet Singh**, Professor (313-577-3917; e-mail: h singh@eng.wayne.edu) is involved in problems of state-variables and system theoretic and Petri New approach to computer hardware and software, vehicle guidance, software engineering, expert systems, VLSI design.

**Pepe Siy**, Professor (Graduate Advisor 313-577-3841; e-mail: psiy@ece.eng.wayne.edu) is interested in pattern recognition, image processing, parallel discrete computational problems, analog and digital VLSI, smart sensor technology.

**Le Yi Wang**, Professor, (313-577-4715; e-mail: lywang@eng.wayne.edu) research interests concentrate on H-infinity optimization, stabilization of time-varying systems, frequency-domain systems identification hybrid control systems, automotive control systems, nonlinear and adaptive control.
James Woodyard, Associate Professor, (313-577-3758; e-mail: woodyard@eng.wayne.edu) works on ion beam analysis and modification of thin-film devices and device materials; hydrogenation, dehydrogenation, and radiation resistance of amorphous semiconductor materials; optical and electrical characterization of device materials and device fabrication.

Chengzhong Xu, Professor, (313-577-3856; e-mail: czxu@eng.wayne.edu) is interested in parallel computing, particularly run-time and operating system support for irregularly structured applications; distributed shared memory systems; multiprocessor server technologies.

Yong Xu, Associate Professor, (313-577-3850; e-mail: yxu@ece.eng.wayne.edu) works on MEMS sensors (flow sensors, pressure sensors, inertial sensors, tactile sensors, etc), MEMS flexible skin technology, intelligent textile technology, and micro/nanofluidics.

Hao Ying, Professor, (313-577-3738; e-mail: hying@ece.eng.wayne.edu) research interest includes fuzzy control and systems, control, modeling, expert systems, image/single processing, neural networks, and ultrasonics, all with biomedical applications.

Yang Zhao, Professor and Chair, (313-577-3404; e-mail: yzhao@eng.wayne.edu) research interests relate to optics, in particular nonlinear optical devices for communications, novel optical materials, optical sensing, lasers.
ECE GRADUATE COURSES

Course descriptions, etc. may be found in the Graduate Bulletin of the University given in this link:

http://www.bulletins.wayne.edu/gbk-Output/gbk-index.html

Telephone Contacts

Electrical & Computer Engineering Office
Room 3100, Engineering Building
5050 Anthony Wayne Drive (corner of W. Warren)
Tel. (313) 577-3920

English Language Institute (ELI)
351 Manoogian Hall
Tel. (313) 577-2729

Office of International Students and Scholars (OISS)
42 W. Warren, 416 Welcome Center
Detroit, MI 48202
Tel. (313) 577-3422;
Fax (313) 577-2962

University Graduate Admissions Office
Office of University Admissions
Welcome Center, 42 W. Warren Avenue, PO Box 2759,
Detroit MI 48202
Telephone: 313-577-3577; Fax: 313-577-3376
Web: http://www.admissions.wayne.edu

College of Engineering Home Page:
http://www.eng.wayne.edu/

ECE Home Page
http://www.ece.eng.wayne.edu/

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