

Northeastern University
Department of Electrical and Computer Engineering

**Graduate Student Guide
2009-2010**

Fall 2009

A Message from the Chair

As one of Northeastern University's leading departments, Electrical and Computer Engineering (ECE) Department continues to expand its scholarly activities. Our department is best known for its student-centered and practice-oriented programs and offers a wide variety of world class research and education opportunities to its students both at the master's and doctoral level.

In the past years, our department has grown significantly both in size and stature and currently has 44 full-time faculty members with 10 IEEE Fellows. Last year, 3 of our junior faculty members have received the prestigious NSF Early CAREER awards, 2 were the recipients of 2008 ONR Young Investigator Awards and one was named the recipient of the Presidential Early Career Award for Scientists and Engineers. Our faculty is affiliated with several centers of excellence, including the Bernard M. Gordon Center for Subsurface Sensing and Imaging Systems, Kostas Nanoscale Technology and Manufacturing Research Center, Institute for Information Assurance, the Center for Microwave and Magnetic Materials and Integrated Circuits and the Center for Communications and Digital Signal Processing. Recently, Northeastern University in partnership with the University of Rhode Island won a new center grant from the Department of Homeland Security, called ALERT (Awareness and Localization of Explosives-Related Threats). We are also very excited about a recently initiated College of Engineering Ph.D. program in the bio-engineering area with tracks led by several of the ECE faculty members.

Our faculty members have active research programs in the areas of Bio-engineering, Communications and Signal Processing, Controls, Power Systems and Power Electronics, Computer Engineering, Fields/Waves and Optics, Micro/Nano/Electron-systems and Devices.

I certainly hope that you will find our graduate program exciting and that it will provide you a complete set of tools and knowledge base to assist you in achieving your career goals. I look forward to personally meeting with each of you during your studies. Please feel free to stop by my office if you have further questions or comments.

Best wishes,

Ali Abur
ECE Department Chair
Department of Electrical and Computer Engineering

The Department of Electrical and Computer Engineering offers graduate programs leading to the degrees of Master of Science in Electrical and Computer Engineering (MSECE), Doctor of Philosophy in Electrical Engineering and Doctor of Philosophy in Computer Engineering.

In the MSECE program a minimum of 32 semester hours of graduate courses with a minimum grade point average of 3.00 is required. Master of Science degree candidates must complete a minimum of two courses from the Master of Science Core Course list.

Master of Science Degree			
	Full-time	Full-time	Part-time
	With Thesis	With Project	Study
Required Core	8 SH	8 SH	8 SH
Technical Electives	16 SH	20 SH	24 SH
Thesis or Project	8 SH	4 SH	0 SH
Minimum SH Required	32 SH	32 SH	32 SH

Master of Science Core Courses

EECE7200 Linear Systems Analysis
 EECE7201 Solid State Devices
 EECE7202 Electromagnetic Theory
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 EECE7203 Complex Variable Theory and Differential Equations
 EECE7204 Applied Probability and Stochastic Processes
 EECE7205 Fundamentals of Computer Engineering
 EECE7352 Computer Architecture
 EECE7353 VLSI Design

In addition, Master of Science degree candidates should select a minimum of four technical electives in consultation with the student's academic or research advisor. The number of technical electives depends on whether the student elects to do the Master's Thesis (8 Semester Hours) or the Master's Project (4 Semester Hours). Part-time students may take eight 4-semester hours of course work to complete the program requirements.

The University converted to a new Registrar's computer system for fall 2009. Please become familiar with the course numbers and general information for graduate students at

<http://www.northeastern.edu/registrar/banner-fl09-gs.html>

On this site please notice the website that converts old course numbers to new course numbers.

<http://www.northeastern.edu/registrar/crsnumref-leg2udc.html>

Within Banner there is a complete course catalog that is the most up-to-date available.

Registration Procedures

One very important change is in registering for Thesis, Thesis Continuation, Dissertation, Dissertation Continuation and Independent Study courses. Effective this fall 2009, students will register for these courses via their myNEU accounts on the Banner system.

GENERAL SCHEDULING INFORMATION

All registration is conducted by telephone or via your myNEU account. Class duration is 100 minutes twice per week; or 210 minutes once per week, with one ten-minute break.

REGISTRATION INFORMATION

Current and continuing students can register for courses online using the [myNEU Web Portal](#). The system allows students to add and drop courses, confirm course registration, find room assignments, and obtain final exam schedules. The system works in real-time. Your course add or drop will be processed immediately, and you can confirm your transaction before you log off.

To register, you must first create your myNEU account. Go to the [myNEU Web Portal](#). Log in using your myNEU Username and myNEU Password (or click on "How do I get a myNEU username and password?" if you have never used the system before). Click on "Self-Service," then click on "Course Registration." Follow the onscreen prompts, and then register for classes. Once registered, new students can get their NU Husky ID card.

STREAMING VIDEO - Streaming Video is audio and video content that is digitally encoded and transferred over a computer network or the Internet for viewing on a multimedia-equipped PC. It is not downloaded as a file, but rather is played as it arrives, on demand. For more information, please view the www.coe.neu.edu website and consult the videostreaming section.

General Petitions

Petitions are available on-line to both part and full time students. Please print the petition and have your academic advisor sign if you are a full-time student; part-time students may return the petition either via scanned PDF file or by mail to Faith Crisley in 405 Dana Hall. Please do not fax the petitions as the fax machine is shared by the entire office.

<http://www.coe.neu.edu/gse/PetitionForm.pdf>

Please note that petitions are used to change concentration, change in status from full to part-time, petition Special Problems in EE classes, (EECE7400 1-4 credits), to request approval of a course as a technical elective that does not appear on the recommended technical elective catalog listing, and to request transfer credit from another college or university, or from a program outside of the Electrical and Computer Engineering department. The form is also used to waive a course requirement, request a time extension for degree completion or to substitute a grade received in one course for another course. Please ignore the processing instructions on the back of the printed petition form which is outdated and follow the sequence for approval below:

- 1) Obtain the advisor signature from your academic or research advisor
- 2) Petition is delivered to Faith Crisley, 405 Dana Hall (or left in her mailbox 440 Dana Hall), or sent via email.

After the petition is reviewed and processed by the chairman of the Graduate Committee, Professor Hanoch Lev-Ari a decision is rendered and the original petition is delivered to the Graduate Office, 130 Snell Engineering for processing. The Graduate Office then mails the student copy to the address provided on the petition. A copy is kept in the Graduate Coordinator's office.

Doctoral Degree Program in Electrical Engineering

A program of study is determined by the candidate and the Dissertation Committee. A typical program consists of 24 semester hours of course work beyond the Master of Science degree. The Ph.D. program, however, must consist of at least 16 semester hours of course work. The exact nature of the program of study will vary among candidates depending on the dissertation subject area and the candidate's preparation. The program will include one minor area of study consisting of at least 8 semester hours of course work beyond the Master of Science degree in an area other than that in which the candidate is concentrating. The minor may be in another discipline within electrical and computer engineering or the minor may be in another relevant technical or scientific discipline. The candidate must achieve an overall minimum 3.000 QPA and a 3.000 QPA in the minor area.

Doctoral Degree Program in Computer Engineering

A program of study is determined by the candidate and the Dissertation Advisor. A typical program consists of 24 semester hours of course work beyond the Master of Science degree. The Ph.D. program, however, must contain at least 16 semester hours of course work. The exact

nature of the program will vary among candidates depending on the dissertation subject area and the candidate's preparation. The program will include a minimum of 8 semester hours of course work beyond the Master of Science degree in non-Computer Engineering courses. The candidate must achieve an overall minimum 3.000 QPA and a 3.000 QPA in the non-Computer Engineering area.

Requirements Applicable to the Doctoral Program in Electrical Engineering and in Computer Engineering

Qualifying Examination and Degree Candidacy

The Ph.D. qualifying examination is the examination for admission to the doctoral program in Electrical Engineering and the doctoral program in Computer Engineering. The examination has the dual purpose of serving as an indicator of the student's capability for successful completion of the Ph.D. in Electrical Engineering or the Ph.D. in Computer Engineering and serving as a guide to the student's advisor in developing a suitable plan of study tailored to the individual needs of the candidate.

Information on Qualifying Examination will be posted on the www.ece.neu.edu website under Graduate Resources in late November and updated during spring 2010 semester. The exam is normally given in each concentration area between March and June.

A student who has received approval to take the qualifying examination is considered a predoctoral student until such time as he or she passes the examination. Upon successful completion of the qualifying examination the student becomes a Ph.D. candidate.

The Ph.D. Qualifying Examination in both programs consists of a written examination in the student's major area. This examination must be taken by all predoctoral students with a Master's degree or equivalent during the spring semester of the first year. Students will be tested on graduate course material as specified by the faculty in the chosen area. A student who fails the written examination will be permitted to retake the examination only once.

Residence Requirement

One year of full-time graduate work or two consecutive years of part-time graduate work satisfy the residence requirement. In the latter case, the student's advisor must approve a detailed time schedule in order to give evidence that at least half of the time is being devoted to the requirements of the graduate school.

Comprehensive Examination

Within three years of establishment of degree candidacy, the student will be required to demonstrate by means of comprehensive examination subject matter knowledge satisfactory for the award of the degree.

The comprehensive examination is an oral examination open to the Department of Electrical and Computer Engineering faculty (assistant professor and above in rank) and administered by the student's Dissertation Committee. Departmental faculty will be informed of the examination via an email at least one week prior to the examination. Normally the examination will be given at the time the Dissertation Proposal is submitted to the Dissertation Committee for approval. As part of this examination the Dissertation Committee will review the student's doctoral program and his or her performance in graduate courses, as well as examine the student on subject matter related to graduate studies and dissertation area. A Ph.D. comprehensive exam checklist will be filled out at this time and added to the student's record. (one copy in the Graduate Coordinator's file and another copy for the student). Copies of the Comprehensive Exam Check list for degrees in Computer Engineering and Electrical Engineering are found in the back of this booklet. When the form is filled in by the doctoral student and signed by the research advisor it becomes part of the student's permanent record and is used for graduate clearance.

Final Oral Examination

The final oral examination will include the subject matter of the doctoral dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining committee.

Academic Advisors 2009-2010

Communications and Signal Processing

David Brady
Dana Brooks
Jennifer Dy
Deniz Erdogmus
Vinay Ingle
Hanoch Lev-Ari
Masoud Salehi
Milica Stojanovic

Computer Engineering

Stefano Basagni
David Kaeli
Yong-Bin Kim
Miriam Leeser
Fabrizio Lombardi
Waleed Meleis
Medhi Tahoori

Control Systems and Signal Processing

Octavia Camps
Bahram Shafai
Mario Sznaier
Gilead Tadmor

Circuits and Semiconductor Devices

Mehmet Dokmeci
Nick McGruer
Juraj Topolancik

Electromagnetics, Plasma and Optics

Anthony Devaney
Chuck DiMarzio
Vincent Harris
Edwin Marengo
Hossein Mosallaei
Mark Niedre
Carey Rappaport
Purnima Ratilal
Nian-Xiang Sun
Carmine Vittoria

Power Systems

Ali Abur, Chairman
Brad Lehman
Sarma Mulukutla
Alex Stankovic

Change of Address

If you have changed your address or have a new address you are required to update your records for the Registrar's Office. This is done on-line by logging into myneu and clicking on the change of address link. For international students your permanent address and off-campus address should match so that all of your Northeastern mail arrives at your local address. Please fill out and return the department information sheet to Faith Crisley if you did not do so at orientation. (Copies will be available on her door and by emailing f.crisley@neu.edu).

Classrooms

Classrooms are assigned by the registrar and are listed on the myneu schedule website.

Computer Resources

The ECE Computer network is run by the Department to provide computing resources to its faculty, staff and students for research work. These resources include UNIX (Sun Solaris, HP/Compaq TRU64 and Linux) workstations and PCs, and a wide range of specialized software packages used for research in various areas of electrical and computer engineering. These facilities are supported by a high-speed network and server infrastructure. Access to these resources is provided via student computer labs and through computing facilities located in research labs. The student computer labs also provide facilities for several courses in electrical and computer engineering and VLSI design.

For students who are involved in research under the direction of a faculty member, access to these computer resources is made available, based on the recommendation of the faculty member.

Computer Accounts

To request a computer account that will enable use of the ECE computer facilities and provide access to email, news and the Internet, please see your research faculty advisor. Requests for the ECE computer account are created using the online account request available at <http://info.ece.neu.edu>, and must be generated only by your research faculty advisor.

Before you begin actively using your computer account please carefully read and understand the policies governing your use, privileges and responsibilities regarding the account. These policies are accessible from any computer in the ECE network on the website <http://info.ece.neu.edu>.

Having an ECE email account assure you of receiving important ECE Department messages regarding meetings, changes in exam schedules, etc.

If you have any questions or require assistance with your computer account, send an e-mail to help@ece.neu.edu.

Graduate Stipend

Stipends are generally paid on the 15th and the last day of the month. Direct deposit is required and you may contact student employment at the Student Employment Office in 101 Curry Student Center. The phone is 617-373-3200. The first paycheck will be available on September 15th, if your paperwork was processed on time. If not you will be paid on the next date. Both state and federal taxes are deducted. U.S. Federal and State withholding forms are available at the HR/Payroll Processing Center at 716 Columbus Avenue, 2nd floor or by calling 617-373-2230. Tuition assistants are taxed on the amount of the tuition waiver. The stipend amount is \$8850.00 for Fall Semester 2009 and \$8850.00 for Spring Semester 2010.

Teaching Assistants: Duties & Responsibilities

This section is provided because of the importance of the supporting role Teaching Assistants (TAs) play in the delivery of educational activities in the department.

Graduate students appointed to TA positions in the ECE department; normally provide needed instructional support for both undergraduate and graduate courses. They may perform any of the following teaching-related duties : 1) grading 2) laboratory instruction 3) holding office hours 4) lab development, and 5) problem-solving recitations or ILS (Interactive Learning Sessions).

The assignment of TAs to the various lecture or lab courses is made by Dr. Farhat, the TA Coordinator & Lab Director in the department. TAs assigned to assist faculty in lecture/lab courses, also report to Dr. Farhat --- who introduces them to current operating procedures in the department, arranges for their training, and oversees their work. As part of their preparation, all new TAs are required to participate in *Grading Training* and in *Lab Training* if they are assigned to a lab course.

Because of the important role TAs play in student educational experience, their full participation in all “scheduled duties” is *mandatory*. These scheduled duties comprise of: lab sessions, office hours, and ILS sessions. While it rarely happens , a TA who anticipates at any given time a *legitimate* difficulty in being present for a scheduled duty , must *at the earliest* bring this to the attention of both Dr. Farhat and the affected faculty member, to resolve the matter in advance.

As part of their ECE departmental orientation, new TAs are required to meet with Dr. Farhat prior to the start of the academic year for introduction , review of their background training, and acquaintance with potential assignments and operating procedures. During that meeting, TAs will be also informed on few related issues and receive a TA-reference pamphlet: *Guidelines for Lab presentations/Course recitations/Grading*. Appointments and TA notification of the above meetings will be made by the office of Ms. Faith Crisley, Graduate Affairs Coordinator.

Finally, to facilitate communications with the faculty member to whom they are assigned , TAs are required to provide the following *Contact information*: 1) e-mail address 2) Campus office Rm.# --if any 3) Telephone #'s --office & home /cell 4) Class schedule : days & times

Mail Room

Mailboxes, copy machine and fax machine are located in 440 Dana. It is the students' responsibility to check their mailboxes weekly for important messages and department notices. Please see your advisor regarding the procedure to follow for access to the copy machine and fax. We ask that you do **not** have your personal mail delivered to this address. (See above instructions on changing your mailing address in myneu.)

Offices

Research Assistants should check with their advisors about office space. Teaching Assistants have offices in changing locations on campus. Most TA's for fall 2009 and spring 2010 are located in 232 Forsyth. Please see Faith Crisley in 405 Dana to gain access to your office. Please note that the rooms will not be available until the middle of September

Registration

Full-time students are required to take 2 courses (8 SH) per semester. Graduate students without assistantships are also required to take 8 semester hours of course work.

Registration for Master's Thesis, Ph.D. Thesis, Continuation and Special Problems in EE courses can be done on-line at the Banner website. Note that Special Problems in EE courses (EECE7400) require approval via a petition before registering. Please look in this guidebook under petition guidelines for link.

The following core courses are suggested for MSECE students in the major areas listed below. Please consult with your advisor before making a final decision.

A listing of all fall 2009 classes are available on Banner and at www.ece.neu.edu, click on course offerings under the Graduate section. A listing of fall classes is also available at the back of this book. Spring 2010 registration begins November 16. An incomplete spring course listing appears at the end of this book; a complete one will be available on Banner at the end of October or early November.

Communications and Signal Processing – majors

EECE7204 CRN 12760 Applied Probability and Stochastic Processes

Please consult advisor for second course

Computer Engineering – majors

EECE7205 Fundamentals of Computer Engineering—videostreamed only—CRN 14017

Please consult advisor for second course

Circuits and Devices - majors

Please consult with your advisor for courses

Electromagnetics - majors

EECE7203 Complex Variable Theory & Differential Equations CRN15324

EECE7202 Electromagnetic Theory I CRN 13101

Control Systems and Signal Processing - majors

EECE7200 Linear Systems Analysis CRN 12447

EECE7204 Applied Probability and Stochastic Processes CRN 12760

Power Systems - majors

EECE7200 Linear Systems Analysis CRN12447

Please consult with your academic advisor. Please inquire of your advisor if you should complete EECE5684 Power Electronics which will be offered in the spring 2010 semester.

Registration Requirements for all Graduate Assistants

Master's degree students, predoctoral and doctoral students, who hold fellowship, research or teaching assistantship positions, are required to register for 8 semester hours of course work per semester, including the summer semester. The assistantship is contingent up registering for the 8 semester hours.

The following courses have been added as an **option** for the graduate assistant who has finished his/her course work but needs to register for 8 semester hours to meet the ECE Department registration requirement.

EECE8984	Master's Research (choose 4 or 8 semester hours)
EECE9984	Doctoral Research (choose 4 or 8 semester hours- must pass Qualifying exam to enroll in this class)

Grades for Master's Research and Doctoral Research courses are Satisfactory (S) or Unsatisfactory (U) at the completion of the program. In the interim the grade of IP (In progress) will be given. Master's Research and Doctoral Research courses do not count towards satisfying the required credit hours for the degree programs.

Advising

Students are assigned academic advisors at the time of admission. The advisors assigned to Research Assistants are both research and academic advisors. If you do not have an advisor or want to know how to contact your advisor, please email Faith Crisley at f.crisley@neu.edu. Faculty and staff can be reached by checking the faculty and staff listing on the ECE website. Staff contacts are also listed later in this guidebook.

MSECE, predoctoral and doctoral students holding research or teaching assistantship positions cannot change their areas of concentration without approval of their current academic/research advisor, the Graduate Affairs Committee Chair and the Director of the Graduate School of Engineering. Changes must be approved by using the general petition. (process described above under Master's program).

Master's Degree Program

Students accepted in the MSECE Program and supported as research or teaching assistants, Fulbright scholars, and industrial fellow are required to complete a Master of Science Thesis. The Master's Project is not an option for these students.

MSECE degree students completing the Thesis option must register for 8 semester hours of Thesis (EECE7990) and EECE7996 Thesis Continuation thereafter.

Instructions for Master's Degree Thesis Preparation and approval are available on the www.ece.neu.edu website under Graduate Resources.

Predoctoral Status

Students admitted to the Ph.D. program as predoctoral candidates who already have a Master's Degree in Electrical Engineering must take the Ph.D. qualifying examination in their first academic year. Those students are expected to work towards completion of the doctoral program without obtaining a second Master's Degree. There are no exceptions to this policy.

Students accepted as predoctoral students and supported as research, teaching, tuition assistants, Fulbright scholars, or industrial fellows but do **NOT** have a Master's Degree are required to take the Ph.D. Qualifying Examination in their first year of graduate study **or second year by petition**. A program plan which includes the date when the student plans to take the Ph.D. qualifying examination must be approved by the student's advisor and submitted to the Chair of the Graduate Program before the end of the fall semester. If the student decides to receive an MSECE degree while continuing in the doctoral program, he/she must file a petition for approval.

Students accepted as predoctoral students and supported as research, teaching, tuition assistants, Fulbright scholars, or industrial fellows who have a Master's Degree **OUTSIDE** the area of Electrical Engineering must take the Ph.D. Qualifying Examination in their first of graduate study **or second year by petition**. A program plan, which includes the date the student expects to take the Ph.D. Qualifying Examination, must be approved by the advisor and submitted to the Department Chair the end of the fall semester. If the student decides to receive an MSECE degree while continuing in the doctoral program, he/she must file a petition for approval.

Failure to take the Ph.D. qualifying examination as required will result in the loss of financial support.

Doctoral Degree

The Ph.D. Qualifying Examination in the ECE Department consists of a written examination in the student's major area. Students will be tested on the course material as specified by the faculty in the chosen area. A student who fails the written examination will be permitted to retake the examination only once.

Within one semester after passing the Ph.D. Qualifying examination, the doctoral candidate must form a Dissertation Committee and petition the Graduate Committee for approval of this Committee. A Dissertation Committee consists of the advisor and two full-time faculty members with background relevant to the thesis topic. The Chair of the Dissertation Committee must be a faculty member of the ECE Department. The Committee may also include a person from industry or another university.

The Dissertation Committee of the Ph.D. student in EE and the Dissertation Advisor for the Ph.D. student in CE are charged with designing an appropriate program that prepares the student to be a successful doctoral-level engineer. A Dissertation Advisor directs the candidate's dissertation research. The Dissertation Committee will approve the dissertation in final form.

Instructions for Doctoral Degree Thesis Preparation and approval are on the www.ece.neu.edu website under Graduate Resources.

EECE8400 Advanced Seminar (4 SH)

Students in the doctoral program are offered this class Advanced Seminar if they are completing their doctorate in Electrical Engineering. Computer Engineering Doctoral candidates are not required to complete an advanced seminar. The topic and material for the seminar assignment for each student will be selected jointly by the seminar coordinator and student's thesis advisor. The grade for EECE8400 Advanced Seminar is either Satisfactory (S) or Unsatisfactory (U). Computer Engineering Doctoral degree candidates are not required to take this course. EE doctoral candidates who do not wish to take this course must file the regular petition for approval from their advisor.

EECE9990 Dissertation (0 SH)

Doctoral candidates are required to register for Dissertation for two consecutive semesters and EECE9996 Dissertation Continuation thereafter until the dissertation is complete.

General Policies

Students accepted as full-time graduate students and supported as research, teaching, or tuition assistants may petition to change status to part-time, and therefore, forfeiting the assistantship. However, all requirements for graduation remain as when admitted to the graduate program.

International students with an F-1 visa are not allowed to change their status to part-time. Contact the International Student & Scholar Institute with any questions at 617-373-2310.

Students may register for EECE7400 Special Problems in Electrical Engineering, (for 1, 2, 3, or 4) Semester Hours). In order to receive credit for a special problems course, the student must

first submit a petition for approval to his/her advisor, to the Graduate Committee, and to the Graduate Engineering Office for approval.

As a general policy graduate students are allowed to take no more than two courses outside the Department of Electrical and Computer Engineering (with approval via a signed petition). Any additional courses may or may not be approved as part of the graduate program requirements.

Registration for Master's Thesis, Dissertation, and Thesis Continuation and Dissertation Continuation can be done on-line through Banner.

The policies contained herein pertain to the Electrical and Computer Engineering Department and are subject to change by formal action of Department faculty.

Administrative Staff:

Each staff person works independently under the supervision of the Department Chair in the following areas. If you have any questions, please go directly to the appropriate staff.

Faith Crisley
Graduate Coordinator
405 Dana
f.crisley@neu.edu

Linda Bonda
Administrative Assistant
to Department Chair
408 Dana
lbonda@ece.neu.edu

Paulette Deery
Financial Officer
401 Dana
pdeery@ece.neu.edu

Fred Dellaporta
Computer Systems
help@ece.neu.edu

Sharon Heath
Front Desk Administration
heath@ece.neu.edu

Ellen Zierk
Undergraduate Academic Advisor
404 Dana
ezierk@ece.neu.edu

Northeastern University
College of Engineering
Electrical and Computer Engineering Department

Graduate Cooperative Education
Goals and Philosophy
August 2009

Goals and Philosophy

In general, the goal of each co-op experience is education in both the student's subject matter area and in the student's professional practice. Generally a graduate student is more apt to benefit from applying academic learning to practice and would benefit less from a job in which the experience is principally non-technical. The emphasis in graduate cooperative education, therefore, is on technically challenging assignments in the student's subject matter area.

Graduate students can be broadly classified into three groups: terminal Master's degree with no research; Master's candidate with research or intent to pursue a PhD; and PhD candidates. Accordingly, co-op assignments must recognize these differences.

For the terminal Master's candidate, academic studies are an extension of their undergraduate program or a basis in an engineering area for students with different undergraduate concentrations, e.g., Physics. For these students, an appropriate assignment is one that allows them the opportunity to function as an entry-level engineer in their field. Approval for a co-op assignment is made by the cooperative education faculty coordinator in consultation with the ECE department. Typically, the student's research or academic advisor would be the appropriate person with whom the co-op faculty coordinator consults.

A co-op assignment for students with research in their plan must be in an area that is relevant to their research. It is recognized that a specific research topic is not always agreed upon at the time when a co-op assignment fits into the academic plan. The goal for students in that situation is an assignment in their subject matter area in which they might identify a suitable research topic. This implies close cooperation among the student, the student's research or academic advisor, and the student's co-op faculty coordinator. Approval for a co-op assignment is made by the co-op faculty coordinator in consultation with the academic and/or research advisor.

PhD students are explicitly engaged in research in a specific subject area. Cooperative work assignments for PhD students should only be considered as a way of contributing to that research. Close cooperation among the student, the research dissertation/thesis advisor or thesis committee, and the co-op faculty coordinator is necessary to ensure meeting this goal. Approval for a co-op assignment is made by the co-op faculty coordinator in consultation with the student's research advisor.

Cooperative Education (Co-op) for International Students

Administration of USCIS and university requirements and procedures, regarding employment of F-1 Visa students, is the responsibility of the International Student and Scholar Institute (ISSI). ISSI offers many Information Sessions each semester and ALL new ECE students are strongly encouraged to attend one of these sessions.

International students on an F-1 visa may participate in work experiences with the appropriate ECE, Engineering Graduate School and ISSI approvals. The policies regarding this are described later. The work experience is typically practical experience or research in either of the following categories:

- Curricular Practical Training (CPT)
- Optional Practical Training (OPT) after graduation
- Pre-completion Optional Practical Training (OPT)

For graduate students in the ECE department, CPT may be applied for after successful completion of the first semester of academic work. Typically this means that co-op assignments would begin following completion of two semesters of academic work.

CPT may be in the form of a six or eight month co-op assignment for most students or an internship for PhD candidates that have completed qualifying exams and are working on their thesis. CPT must be integral with the ECE program. No assignments will be allowed that are not consistent with the student's program of study.

Once approved by your advisor and co-op faculty advisor, you must complete ISSI Form 152 (for co-op) and Form105 (for Internships).

OPT is designed to provide you with an opportunity to obtain actual employment experience in your field following graduation. As you approach completion of your degree program, you should apply for this through ISSI.

Pre-Completion OPT is considered only on an exception basis by the Graduate School and is reserved for candidates who are in the final stages of thesis approval and have otherwise completed all degree requirements. It is **not** to be considered as an opportunity to start work part time or full time while completing your coursework.

Graduate Assignments

Extending graduation for Master's candidates to allow more than one six or eight month work term of co-op is not permitted. A PhD candidate may qualify for a second co-op or internship term if recommended by the department for on-going research in industry. The maximum amount of CPT is a total of twelve months, otherwise the student is **not** eligible for OPT after graduation.

Students who fail to find a co-op assignment will have to register for classes in order to retain their student status. Assuming that all coursework is completed, PhD candidates may extend their co-op work term to complete a research project if recommended by the research advisor in consultation with the co-op faculty coordinator. The dates for this work do not have to coincide with the semester start/end dates; however the student needs to register for thesis continuation throughout the period.

Students with specialized courses of study must assume responsibility for finding their own assignments; help from co-op faculty coordinator will be on a best-efforts basis and is not guaranteed to result in an assignment. Graduate students are encouraged to confer with their academic or research advisors for contacts in industry to increase the likelihood of finding an appropriate co-op assignment. The student's academic or research advisor does not have the authority to waive the requirement that the co-op assignment be related to the student's academic or research field of study.

Co-op as a financial necessity

We recognize that graduate school tuition and living costs pose a significant financial burden for students. Cooperative education assignments traditionally have offered a way to earn some portion of the costs of attending Northeastern. A variety of legal requirements only allow co-op assignments that are a required part of the curriculum in order to classify the student on the assignment as full-time. For students who are in the USA on student visas, a job that does not provide a definite educational component in their field of study jeopardizes their status. Therefore, financial necessity alone does not justify a job that does not meet the criterion of relevance to the student's field of study or research area.

Northeastern University
College of Engineering
Electrical and Computer Engineering Department

Graduate Cooperative Education
Policies and Procedures
August 2009

Every potential College of Engineering Graduate co-op student must meet certain Eligibility Requirements in order to participate in co-op. Below are general requirements for all **ECE students**; however students must work closely with their cooperative education faculty coordinator to ensure that they meet any major-specific requirements and deadlines. *A student's co-op faculty coordinator, in consultation with the academic department, determines if he/she meets the eligibility requirements for any co-op period.*

Academic Eligibility Requirements

1. Students must be enrolled as a full-time student in the Graduate Program of the College of Engineering.
2. Students must have completed two full-time semesters* in the College of Engineering Graduate School in their degree program before the start of their co-op work term.
3. Students must have at least one semester remaining in their degree program after the proposed co-op term. The intent is that this be a full-time semester unless the student has only their thesis or one additional course required for completion of their degree. Students will not be eligible for co-op once they have completed the minimum academic requirements for their degree. Master's degree candidates who intend to pursue admission to a doctoral program will not be eligible for co-op once they have completed the requirements for the Master's degree.
4. **Students in the ECE graduate program must have at least a 3.2 QPA to be eligible for co-op prior to the beginning of the application process.**
5. Students are eligible for co-op only with approval from their ECE research or academic advisor.
6. Students must have successfully completed the Introduction to Cooperative Education course (GSE G001) to be eligible for co-op.

* A full-time semester is defined to include two (2) four-semester-hour courses that count toward the degree, as a minimum.

Additional Eligibility Requirements

1. Students may not hold a Graduate Stipended Assistantship at the University during the semester/s planned for co-op.
2. Students must resolve any previous disciplinary or academic probation issues, or have their co-op faculty coordinator approve a plan to resolve these issues, prior to being referred to or applying for any co-op positions.
3. Non-US citizens with student visas must have valid I-20s.
4. Co-op employers may require pre-employment and/or during-employment screenings, including physical examinations, criminal background checks, security clearances, and drug testing. Failure to participate in, complete, or pass these qualifying screenings will impact the student's eligibility and opportunities for co-ops with these special hiring requirements.

Application Process

1. All students must apply for co-op through the College of Engineering Graduate School. On the application form, the following signatures, in the order listed below, are required for co-op approval:
 - a. The designated representative in the Graduate School of Engineering
 - b. Academic or Research (Dissertation/Thesis Advisor) as specified
 - c. Engineering Co-op Faculty Coordinator
 - d. Department Chair (if required)
2. Students must submit co-op applications to the College of Engineering Graduate School during the semester preceding the intended co-op term. The deadline for applying for the Spring/Summer work term is October 15 and the deadline for applying for the Summer/Fall work term is February 15 of each year. If those dates fall on a weekend, the deadline is the next business day. Upon approval by the COE Graduate School and your advisor, the forms must be submitted to the ECE Co-op Faculty Coordinator to initiate the co-op process.

Co-op Assignment Criteria

1. All co-op positions must relate to the student's chosen field of study/major and/or thesis topic.
2. All co-op placements must be full time (35 hours/week minimum) positions.
3. The following are approved co-op cycles:
 - a. Spring/Summer I (6 months)
 - b. Spring/Summer I/Summer II (8 months)
 - c. Summer II/Fall (6 months)
 - d. Summer I/Summer II/Fall (8 months)
4. Co-op start and end dates must correspond with the beginning or end of an academic term (spring, fall, Summer I or Summer II) with allowance for employer requirements or special circumstances.

5. Exception to items 3 and 4 above may be allowed for unique cases with the approval of the student's co-op faculty coordinator in consultation with his/her academic or research advisor.
6. In certain cases, students may take one course per academic semester while on co-op with the approval of the department and the co-op faculty coordinator. A lab to accompany a course is not considered a second course even if it has a distinct course number. A lab that is not related to a course taken at the same time while on co-op will not be acceptable. Courses that are taken during the day while on co-op will require formal approval from the employer as well. That **written approval** must be submitted to your co-op faculty coordinator in advance of the start of the course.

Formalizing a Co-op Position

1. The assigned co-op faculty coordinator must approve the co-op position before a student may accept an offer of employment.
2. If the position was obtained outside of the University's co-op referral system (myneu COOL), students must provide to the ECE assigned co-op faculty coordinator a detailed position description with contact information for the employer prior to accepting any job offer.
3. Students must provide a written copy of any offer of employment to their co-op faculty coordinator prior to acceptance of the position.
4. Students must register for Co-op through the Graduate School of Engineering for each semester they will be on co-op.
5. Foreign nationals who hold Student Visas must complete all necessary documentation with their co-op faculty coordinator and ISSI prior to the start of any co-op position.

Co-op Grading/Requirements

1. Students will be assigned one of the following grades by their co-op faculty coordinator at the completion of a co-op assignment: Satisfactory (S), Unsatisfactory (U), or Incomplete (X).
2. To earn a Satisfactory grade, students must complete the following:
 - a. Satisfactorily perform duties of their co-op assignment for the duration of the term/s as shown in their Employer Evaluation.
 - b. Co-op employer should complete an Employer Evaluation form at the end of the co-op assignment. Students are responsible for providing this form to their employer, requesting its completion, and providing the form to the co-op faculty coordinator when they return from co-op.
 - c. At the end of the co-op assignment, student must complete a Student Evaluation of co-op work assignment and return it to the co-op faculty coordinator.
 - d. Student must complete a reflection activity at the end of the co-op assignment. The specific activity will be determined by the co-op faculty coordinator, but may include discussions with their Co-op and Academic faculty, a reflection paper or a brief presentation.
3. Note that the co-op grade will appear on the student's academic record.

Cooperative Education Appeals Process

If a student does not meet the above requirements or if their co-op faculty coordinator has determined he or she is not eligible to go on Co-op for a desired session, the student may appeal, in writing, to the ECE Graduate Studies Committee. This committee will evaluate the appeal and discuss it with the Director of Cooperative Education for the College of Engineering.

Appendix- New Rules for Extension of Optional Practical Training

Interim Final Rule on OPT Extensions

On April 8, 2008 the Department of Homeland Security officially announced the Interim Final Rule regarding the extension of Optional Practical Training for international students. This rule is effective as of April 8, 2008.

All F-1 students who are currently or who will be applying for Optional Practical Training will be affected by this new rule. The highlights are as follows:

- Students on OPT must maintain their status which is dependent upon employment. In order to maintain status individuals on post-completion OPT must not exceed more than 90 days aggregate of unemployment during post-completion OPT.
- The deadline for applying for OPT has been extended. Students may apply for OPT 90 days before their program completion date but no later than 60 days after their program completion date.
- All students and their employers now have additional reporting responsibilities. In addition to keeping the ISSI informed of address changes, students are responsible for keeping the ISSI informed of employment (i.e., location of employment, gaps of unemployment). Employers' responsibilities include notifying the ISSI within 48 hours of employment termination or the employee ceasing employment on his own accord.

Students who are currently on OPT and have successfully maintained their status may be eligible for the option of extending their OPT. There are two options for extending one's OPT:

- Students may apply at least 90 days before the current post-completion OPT expires for an additional 17 months of OPT if they hold a Bachelor's, Master's or Ph.D. degree in a designated STEM (Science, Technology, Engineering and Mathematics) field; not all majors qualify for this extension.
- OPT is automatically extended for all individuals whose employers have petitioned for an H-1B on their behalf. Once an individual receives notice of their H-1B (approval or denial) their OPT will be extended until the H-1B employment authorization goes into effect. If denied the individual must halt work immediately.

* While this notice may be used as a general reference, it does not contain all details of the newly implemented regulations. If you should need further information please consult with an ISSI advisor at 405 Ell Hall or call 617.373.2310.

The ISSI is currently developing a protocol and revising its forms to accommodate individuals planning on applying for the initial 12-month OPT period, as well as for those who are interested in applying for an extension. Please check the ISSI's website for updates and changes regarding this Interim Rule.

Coop Class Registration Information Fall 2009

Please read this notice BEFORE registering!

All **ECE** students who want to take the "*Introduction to Cooperative Education*" course must register for section 03 with Professor Kent.

16277	GSE G001	ENCP 6000	03	Introduction to Coop EECE Students ONLY	F	9:50 AM	11:30 AM	Kent
16279	GSE G650	ENCP 6964	02	Coop Work Experience EECE Students ONLY	n/a			Kent

Helpful Northeastern University Websites

Billing

www.neu.edu/registrar/billing.html

Financial Aid

www.financialaid.neu.edu

Northeastern University, in conjunction with TuitionPay, offers an interest-free monthly payment plan (open to both international and domestic students). To learn more, contact TuitionPay at 1.800.635.0120 or go to www.tuitionpayenroll.com/northeastern.

University Calendars including Course Registration Dates and Final Exam Dates

www.neu.edu/registrar/calendars.html

Registrar Transcripts/Records

<http://www.neu.edu/registrar/acrecords.html>

International Student and Scholar Institute (ISSI)

www.neu.edu/issi

Graduate School for the College of Engineering

<http://www.coe.neu.edu/gse/>

University Information Services (including Blackboard course information)

<http://infoservices.neu.edu/>

Campus Recreation

<http://www.campusrec.neu.edu/>

Special Topics Course Descriptions—Fall 2009
Electrical and Computer Engineering
Northeastern University
(2 pages)

EECE5698 Special Topics Electromagnetics/Photonic Devices

Professor Mosallaei Sequence E TF 11:45-1:25

CRN/KEY Number 15753

Introduction to basic principles of photonic devices. Topics include crystal optics, dielectric optical waveguides, waveguide couplers, electro-optic devices, magneto-optic devices, acousto-optic devices, second-harmonic generation, optical Kerr effect, optical switching devices - Theory and concept with novel optical applications are highlighted. This will be a multidisciplinary course and many emerging areas in THz and NanoOptics are highlighted, helping the students to find their desired career in academia or industry.

EECE5698 Special Topics Biophotonics

Professor Niedre, Sequence B MW 2:50-4:30

CRN/Key Number 15751

This special topics course treats “biophotonics” and discusses the theory and practice of biological and medical applications of lasers. Topics covered include fundamentals of light propagation in biological tissues, light-matter interactions such as elastic and inelastic scattering, fluorescence and phosphorescence; diagnostic imaging techniques such as confocal fluorescence microscopy, diffuse optical tomography and optical coherence tomography; therapeutic interventional techniques including photodynamic therapy, laser thermal therapies and fluorescence guided surgeries

EECE5698 Special Topics Acoustics and Sensing

Professor Ratilal

Sequence D TF 9:50-11:35, CRN/Key 15847

Introduces the fundamental concepts of acoustics and sensing with waves. Provides a unified theoretical approach to the physics of image formation through scattering and wave propagation in sensing. The linear and nonlinear acoustic wave equation, sources of sound. Reflection, refraction, transmission and absorption. Bearing and range estimation by sensor array processing, beamforming, matched filtering, and focusing. Diffraction, bandwidth, ambient noise and reverberation limitations. Scattering from objects, surfaces and volumes by Green's Theorem. Forward scatter, shadows, Babinet's principle, extinction and attenuation. Raytracing and waveguides in remote sensing. Applications to acoustic, radar, seismic, thermal and optical sensing and exploration.

EECE5698 Special Topics Computer Vision

Professor Camps

Sequence F TF 1:35-3:15

CRN/key 15852

COMPUTER VISION SYSTEMS bring together imaging devices, computers, and sophisticated algorithms to solve problems in areas such as industrial inspection, autonomous navigation, human-computer interfaces, medicine, image retrieval from databases, realistic computer graphics rendering, document analysis, and remote sensing. The goal of computer vision is to make useful decisions about real physical objects and scenes based on sensed images. Achieving this goal requires obtaining and using descriptions (models) of the sensors and the world. Computer vision is an exciting but disorganized field that builds on very diverse disciplines such as image processing, statistics, pattern recognition, control theory and system identification, physics, geometry, computer graphics, and learning theory. In this class we will present an introduction to topics such as image formation, segmentation, feature extraction, matching, shape recovery, dynamic scene analysis and object recognition.

Fall 2009 Graduate Classes

15347	EECE5580	Classical Control Systems
15845	EECE5646	Optics for Engineers (GRAD ONLY)
15846	EECE5646	<i>Optics For Engineers (video streamed)</i>
16085	EECE5682	Power Systems Analysis
16086	EECE5682	<i>Power Systems Analysis (videosteamed)</i>
15751	EECE5698	SP. Topics-Biophotonics
15753	EECE5698	SP. Topics EM-Photonic Devices
15847	EECE5698	SP. Topics-Acoustics & Sensing
15852	EECE5698	SP. Topics Computer Vision 1
12447	EECE7200	Linear Systems Analysis
12458	EECE7200	<i>Linear Systems Analysis (video streamed)</i>
13011	EECE7202	Electromagnetic Theory 1
13015	EECE7202	<i>Electromagnetic Theory I(video streamed)</i>
15324	EECE7203	Complex Variable Theory/Diff. Eqs
15325	EECE7203	<i>Complex Variable Theory/Diff. Eqs (video streamed)</i>
12760	EECE7204	Applied Prob. & Stochastic Proc.
12759	EECE7204	<i>Applied Prob. & Stochastic Proc. (video streamed)</i>
14017	EECE7205	<i>Fund. of Computer Eng. (video streamed - only)</i>
15352	EECE7211	Nonlinear Control
12758	EECE7240	Analog Integrated Circuits
12756	EECE7240	<i>Analog Integrated Circuits (video streamed)</i>
12518	EECE7243	Integrated Circuit Fabrication
16388	EECE7293	Modern Imaging
16389	EECE7293	<i>Modern Imaging (videostreamed)</i>
15326	EECE7312	Statistical/Adaptive Signal Processing
15327	EECE7312	<i>Statistical/Adaptive Signal Proc (video streamed)</i>
15353	EECE7337	Information Theory
15354	EECE7337	<i>Information Theory (video streamed)</i>
16281	EECE7352	Computer Architecture
16280	EECE7352	<i>Computer Architecture (video streamed)</i>
15355	EECE7368	High level Design of Hardware/Software Sys.
14110	EECE7398	SP. Topics-Emerging Tech. for Computing
15329	EECE8400	Advanced Seminar
15853	ENGR5670	Sustainable Energy
16277	ENCP6000	Introduction to Coop EECE only
16279	ENCP6964	Coop Work Experience EECE only

Electrical and Computer Engineering

Shafai	D	TF 9:50-11:30
DiMarzio	A	MTh 11:45-1:25
DiMarzio		
Abur	B	MW 2:50-4:30
Abur		
Niedre	B	MW 2:50-4:30
Mosallaei	E	TF 11:45-1:25
Ratilal	D	TF 9:50-11:30
Camps	F	TF 1:35-3:15
Tadmor	E	TF 11:45-1:25
Tadmor		
Serafim	B	MW 2:50-4:30
Serafim		
Devaney	A	MTH 11:45-1:25
Devaney		
Ingle	A	MTH 11:45-1:25
Ingle		
Basagni	B	MW 2:50-4:30
Sznaier	F	TF 1:35-3:15
Kim	G	TF 3:25-5:05
Kim		
Dokmeci	A	MTh 11:45-1:25
Marengo	D	TF 9:50-11:30
Marengo		
Lev-Ari	E	TF11:45-1:25
Lev-Ari		
Salehi	A	MTh 11:45-1:25
Salehi		
Leeser	D	TF 9:50-11:30
Leeser		
Schirner	F	TF 1:35-3:15
Tahoori	F	TF 1:35-3:15
Silevitch	E	TF 11:45-1:25
Lehman	B	MW 2:50-4:30
Kent	F	9:50-11:30
Kent	NA	NA

Spring 2010 Electrical and Computer Engineering Classes Incomplete List Times TBA in late October

EECE5666	Digital Signal Processing	Erdogmus
EECE5684	Power Electronics	Stankovic
EECE5686	Electric Machines	Mulukutla
EECE7201	<i>Solid State Devices (video streamed)</i>	McGruer
EECE7242	<i>Integrated Circuits for Comm. & Signal Proc.(video streamed)</i>	Farhat
EECE7270	Electromagnetic Theory II	Marengo
EECE7275	Antennas	Rappaport
EECE7310	Modern Signal Processing	Erdogmus
EECE7313	Pattern Recognition	Dy
EECE7335	<i>Detection and Estimation (videostreamed)</i>	Brady
EECE7336	<i>Digital Communications (video streamed)</i>	Salehi
EECE7347	Special Topics in Comm.	Stojanovic
EECE7353	<i>VLSI Design (video streamed)</i>	Kim
EECE7366	Special Topics in Computer Engineering 1	Lombardi
EECE8400	Advanced Seminar	Lev-Ari
ENCP6000	Introduction to Coop EECE only	Kent
ENCP6964	Coop Work Experience EECE only	Kent

**Department of Electrical and Computer Engineering
Annual Application for TA Assistantship Renewal
Submission deadline – 2/3/2010**

Name of applicant: _____

Date: _____

Program (*MS or PhD*): _____

Qualifying exam passed (*year*): _____

First year enrolled in graduate program (*check one*): 2009 2008 2007 2006 other

Area of Research Concentration (*check one*): Circuits&Devices Computer Eng
 Comms&SigProc Control&SigProc Power Systems Electromag

Current support (*check one*): TA RA/TA RA none

Name of research advisor (*if any*): _____

Students—please attach a copy of your resume or CV to form before providing to your advisor.

Research Progress (*This section must be completed by research advisor, if applicable*)

Student's research progress (*check one*):

Outstanding Good Average Poor

Number of manuscripts co-authored by the applicant and submitted for review in last 12 months (*check one*): 0 1-3 4+

Comments on performance: _____

Signature of Research Advisor: _____

Date: _____ Instructions to

advisor: **Please submit to Faith Crisley before 2/3/2010.**

Recommendation of TA Coordinator

Student should meet with TA Coordinator before approval of assistantship (*check one*): yes
 no

Signature of TA Coordinator: _____

Date: _____

ECE Graduate Affairs Committee Decision

Assistantship approved (*check one*): TA RA/TA none

Signature of GAC Chair: _____
_____ Northeastern University

**Electrical and Computer Engineering Department
Doctoral Degree in Computer Engineering**

8/09

Ph.D. Comprehensive Exam Checklist – Computer Engineering

Name _____

Qualifying Exam passed on _____ Conditional Pass? Yes No

If passed conditionally list the courses you took to become a Ph.D. candidate:

<u>Course</u>	<u>Date Taken</u>	<u>Grade</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Major Area: Computer Engineering

Course Work Beyond the MSECE taken in Major Area: (approx. 16 SH beyond MSECE)

<u>Course</u>	<u>Date Taken</u>	<u>Grade</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Minor Area:

Course Work Beyond the MSECE taken in Minor Area: At least 8 SH
(taken in non-Computer Engineering Area)

<u>Course</u>	<u>Date Taken</u>	<u>Grade</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

ECEG399 Advanced Seminar NOT REQUIRED

Ph.D. Dissertation Proposal Title: _____

Ph.D Comprehensive Exam Date _____ Research

Advisor Signature _____

Other Dissertation Committee Members:

Northeastern University
Electrical and Computer Engineering Department
Doctoral Degree in Electrical Engineering
8/09

Ph.D. Comprehensive Exam Checklist – Electrical Engineering

Name _____

Qualifying Exam passed on _____ Conditional Pass? Yes No

If passed conditionally list the courses you took to become a Ph.D. candidate:

<u>Course</u>	<u>Date Taken</u>	<u>Grade</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

Major Area: (total major area courses approximately 16 SH)

<u>Course</u>	<u>Date Taken</u>	<u>Grade</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Minor Area:

Course Work Beyond the MSECE taken in Minor Area: At least 8 SH
(taken in other area than Concentration/Major)

<u>Course</u>	<u>Date Taken</u>	<u>Grade</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____

ECE G399 Advanced Seminar Date Taken Passed: ___ Failed: ___

Ph.D. Dissertation Proposal Title _____

Ph.D. Comprehensive Exam Date: _____

Research Advisor Signature _____

Other Committee Members: _____