

# EE-EP Graduate Screening Exam Handbook for PhD Students Enrolled on or after Fall 2013<sup>1</sup>

This document is only applicable to students enrolled into the PhD program **on or after Fall 2013**.

## Introduction

This Electrical Engineering–Electrophysics (EE–EP) Graduate Screening Exam handbook has been created to assist EE students, desiring to pursue the PhD in EE–EP, with their preparation and completion of the Graduate Screening Exam process. Note that this document discusses mainly the EE-EP Screening Exam and its requirements; please refer to the USC Graduate School section of the current USC Course Catalogue (available at <http://catalogue.usc.edu>) for additional PhD requirements.

This document has four sections: Sec. I describes the Screening Exam and its format; Sec. II discusses the exam core courses, Sec. III presents some frequently asked questions and their answers, and Sec IV provides a list of current EE-EP faculty members and their corresponding areas of interest.

The information described herein pertains only to the EE–EP Graduate Screening Exam. The same procedures may not be in use in Electrical Engineering–Systems (EE-Systems), nor does successful completion of the Graduate Screening Exam in EE-EP automatically substitutes for the Graduate Screening Exam in EE-Systems, or vice versa.

Considerable effort had been made to render this handbook comprehensive and accurate. In spite of this fact, it can be anticipated that situations will occur where questions and interpretations of the material here presented will arise. In these cases the current Chair of the EE–EP Graduate Screening Exam committee (Prof. Aluizio Prata) should be contacted directly.

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<sup>1</sup> Revised on August 15, 2013

## **Section I - The EE-EP Graduate Screening Exam and its Format**

The EE–EP Graduate Screening Exam is an academic process that serves as an entrance exam for the PhD in EE-EP. Its primary purpose is to assure a minimum broad level of proficiency with Electrical Engineering matters, as perceived by the EE-EP department faculty. It is the basis of your recommendation for formal acceptance into the PhD program on behalf of the department to the Graduate School. The Graduate Screening Exam is mandatory for all aspiring PhD students admitted in EE–EP. This Section describes the various components of the EE-EP Screening Exam.

The total duration of the EE-EP Screening Exam is three academic semesters (not including Summer terms), counted immediately after admission into the PhD program. At the end of these three semesters your progress will be evaluated by the Screening Exam Committee. To pass the Screening Exam you need to successfully satisfy three requirements:

- 1) Complete a minimum of four core courses<sup>2</sup>, and satisfy the necessary GPA requirement;
- 2) Complete a minimum of six 500 or higher level classes, not including Directed Research, with a minimum letter grade of “B” in each course;
- 3) Secure a PhD advisor.

Below more details is provided on these three items and their successful completion criteria.

### ***Core Course Requirement***

To pass the Screening Exam you are required to have successfully completed, at the end of the first three semesters of the PhD program, a minimum of four core courses. The list of core courses, and their selection criteria, is provided in Sec. II.

Your progress in the four core courses is determined using the GPA of only the four core courses; this core course GPA is considered your Screening Exam GPA. In the encouraged event that you have taken more than four core courses, the Screening Exam GPA is computed using the core courses in which you have obtained the highest grades.

To *summarily* pass the core course requirement you must take four core courses and secure a minimum GPA of 3.70 on these courses. This must be done by the end of your first three semesters in the PhD program.

You will *summarily* fail the Screening Exam if your GPA in the core courses is below 3.30, or if you do not complete the four core courses before end of your first three semesters in the PhD program.

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<sup>2</sup> The core courses are discussed in Sec. II of this handbook.

If your Screening Exam GPA is found to be between 3.30 and 3.70, at the end of your first three semesters in the PhD program, the entire EE-EP faculty will review your academic progress, and determine whether you have passed or failed the Screening Exam.

### ***500 or Higher Level Classes Requirement***

To pass the Screening Exam you are required to have successfully completed, by the end of the first three semesters of the PhD program, a minimum of six 500 or higher level courses. For Screening Exam purposes, Directed Research is not considered a 500 or higher level course. Note however that any or all of your core courses can be counted towards this 500 or higher level course requirement.

To count towards the Screening Exam, the 500 or higher level courses must be selected from the classes offered by either the Viterbi School of Engineering, or by the departments of Biological Sciences, Chemistry, Mathematics, or Physics. Please note that PhD students are allowed to take courses outside these departments, and they can in principle count towards the PhD. However, to count towards the Screening Exam 500 or higher level course requirement, classes taken outside these departments require previous approval by the Screening Committee.

The 500 or higher level class requirement is considered satisfied if you have completed all these classes with at least a “B” letter grade; a simple Pass grade is not acceptable. Note that this minimum “B” grade requirement pertains only to the Screening Exam, and the Graduate School may have additional GPA requirements for granting the PhD.

### ***PhD Advisor Requirement***

As part of your Screening Exam effort you must review the research areas of each faculty of the EE–EP department, with the objective of establishing mutual areas of interest. You should then meet individually with the professors of your interest, to discuss the possibility of having one of them support you as a PhD student. Section IV of this handbook lists the EE-EP faculty and their corresponding areas of interest.

Some students may decide to work with advisors outside the EE–EP Department. A special permission is required in these cases, and must be obtained from the EE–EP Graduate Screening Exam Committee, prior to completing the Graduate Screening Exam process.

The PhD advisor requirement is considered satisfied if, at the end of your first three semesters in the PhD program, a faculty has agreed to support you towards the PhD.

## ***Graduate Screening Exam Pass-Fail Decision Criteria***

After completing the Screening Exam you will find yourself in one of the following three pass-fail categories:

- 1) **Summarily Pass:** A minimum GPA of 3.70 in the four core courses, completion of six 500 or higher level classes (not including Directed Research) with a minimum letter grade of “B” in each course, plus a PhD advisor;
- 2) **Summarily Fail:** A GPA below 3.30 in the four core courses, or completion of fewer than six 500 or higher level classes, or no PhD advisor;
- 3) **Faculty Decision:** A GPA between 3.30 and 3.69 in the four core courses, completion of six 500 or higher level classes (not including Directed Research) with a minimum letter grade of “B” in course, plus a PhD advisor;

## **Section II - Core Courses**

Successful completion of four core courses is required to pass the Screening Exam. Two courses must be from the current three major areas of interest of EE–EP; these two courses are intended to provide useful basic general knowledge. The third and fourth courses are intended to provide either a strong engineering background or additional depth in a chosen area of specialization.

### **Pick two out of these three major areas courses:**

EE 536a	Mixed Signal Integrated Circuit Design
EE 539	Engineering Quantum Mechanics
EE 570a	Advanced Electromagnetic Theory

### **Pick a third and a fourth course from either the above list or from:**

EE 506	Semiconductor Physics
EE 529	Optics
EE 531	Non-Linear Optics
EE 536b	Mixed Signal Integrated Circuit Design
EE 540	Introduction to Quantum Electronics
EE 562a	Random Processes in Engineering
EE 570b	Advanced Electromagnetic Theory
EE 577a	VLSI System Design
EE 607	Microelectromechanical Systems
EE/MASC 501	Solid State Physics
PHY 510	Methods of Theoretical Physics

It is very important that you maintain a sufficiently high GPA in the above courses. It is therefore important to be sure that you have adequate preparation before signing up for a core course. You will have only one chance to take any particular course from the above list. In order to help you make the decision of whether or not to start with a Graduate Screening Exam course or one of its prerequisites, please consult the USC catalogue. You are also strongly encouraged to directly contact the faculty teaching the course. Furthermore, it is important to attend the advisement meeting upon your entry into the Graduate Screening Exam procedure.

## **Section III – Commonly asked questions and their answers**

### **How and when can I sign up for the Graduate Screening Exam?**

Upon admission to the PhD program in EE you are automatically considered enrolled in the process of taking the EE Screening Exam. However, in order to assure proper communication with the Screening Exam committee (e.g., update letters are periodically sent out each semester), it is required that you contact the EE Student Services Office (located in EEB 102) and sign up for either the EE-EP or the EE-S Graduate Screening Exam at <https://myviterbi.usc.edu> (note that access to this site only becomes available after you have registered for the first semester of classes). By doing this you will also assure that all your contact information is current. This registration should be done as early as possible, and before the end of your first semester into the PhD program. After the first semester any registration changes require approval by the Screening Exam Committee. Please keep in mind that, independently of registration, your Graduate Screening Exam automatically starts upon your admission into the EE PhD program.

### **Who needs to take the Graduate Screening Exam?**

All EE-EP students are required to take the EE-EP Graduate Screening Exam, and the exam is available only to students admitted into EE-EP. Students from other departments are required to take the Graduate Screening Exam of their corresponding departments. However, in some rare cases, and depending on the specific research area of interest, an EE-EP student may be given the permission to take the EE-Systems Graduate Screening exam instead, or an EE-Systems student may be given the permission to take the EE-EP Graduate Screening Exam instead. These exceptional cases are handled by the Graduate Screening Exam committee, and are individually reviewed and approved or rejected ahead of time. Also, once the Graduate Screening Exam process is initiated in either EE-EP or EE-Systems, it must to be completed where it was initiated.

### **How long do I have to complete the Graduate Screening Exam process?**

Once you have been admitted to the PhD program you must complete the Screening Exam process within three semesters. For example, if you start the PhD program in the Fall 2013 term you need to complete the Screening Exam process by the end of the Fall

2014 term. Exceptions to this rule are made only at the discretion of the Graduate Screening Exam committee. Note that your EE PhD admission date is considered the official starting date of your Graduate Screening Exam process.

In some rare cases with students being supported by Research Assistantship, a need to take core classes' prerequisites can render the three semesters Screening Exam completion deadline impractical. These cases are handled by the Screening Exam Committee on an individual basis, and it is the student's responsibility to approach the Screening Exam Committee about the problem early in the Screening Exam process.

### **How should I prepare for the Graduate Screening Exam?**

To prepare for the Graduate Screening Exam it is very important to make sure that you receive proper advisement. Make sure that you attend the meeting with the Screening Committee at the beginning of your first academic year in the program. One of the purposes of this meeting is to explain the assumed background for each of the core courses. This will enable you to determine whether or not you need to take an appropriate prerequisite course before a particular core course. Passing the Graduate Screening Exam requires a high GPA in the core courses and you are only allowed to take each course once. It is important, therefore, that you have adequate academic preparation before signing up for a core course.

Overall you need to take a minimum of six 500 or higher level courses, and you should also be in the process of choosing a research direction. For this last reason the Graduate Screening Exam requires that you secure a PhD advisor.

### **How is the Screening Exam GPA calculated?**

The Screening Exam GPA (i.e., the four Core Courses GPA), is calculated using the same formula that is used to determine any other USC GPA. To be sure, you can easily check your GPA by accessing the calculator available on the website <http://sait.usc.edu/resed/myfresh/GPACalculator.aspx>. As examples, and considering that all classes have three units, here are some representative GPA results:

Grades on the four core courses	GPA
A-, A-, A-, A-	3.70
A, A, B+, B+	3.65
A, A-, B, B-	3.35
B+, B+, B+, B+	3.30

### **How do I *summarily* pass the Graduate Screening Exam?**

To summarily pass the Screening Exam (and this is the most desirable option) you need to satisfy the following three requirements by the end of your third semester into the PhD program:

- (1) Complete the Graduate Screening Exam core courses with a Screening Exam GPA that is at least 3.70. In the event that your successful completion of these courses requires that you take appropriate prerequisite classes, sometimes adjustments can be made in the length of time nominally required for you to complete the entire Graduate Screening Exam process.
- (2) Complete a total of six 500 or higher level courses (not including Directed Research), with a minimum letter grade of B in each course;
- (3) Secure a PhD advisor.

### **How do I select a faculty advisor?**

One of the most important parts of a faculty member's responsibilities is the guidance, mentoring, and involvement of graduate students in state-of-the-art research activities. They are available to work with students. You are strongly encouraged to contact faculty who are working in the areas in which you wish to pursue your thesis research. It is a good idea to make an appointment and be prepared to discuss your ideas. This direct interaction with faculty is one of the best ways to learn about opportunities for selecting a faculty advisor. Also useful is to take classes offered by the faculty associated with your research areas of interest, as well as attend technical seminars.

Technical seminars covering various aspects of EE-EP research are held frequently throughout campus. All EE-EP students pursuing their PhD receive seminar notices from the department. Additionally, advertisements are posted in the PHE and EEB buildings, and around several other buildings of the Viterbi School of Engineering. Attending these seminars will keep you posted on state-of-the-art matters relevant to EE areas of interest. This is an important part of your PhD education, and will increase your capability of selecting an appropriate PhD advisor.

### **What if I wish to transfer a course that I have taken outside USC?**

If you have taken courses outside USC and you would like to transfer them for credit, then the normal Graduate School procedure for obtaining credit for transfer courses applies. However, academic credit for these courses does not necessarily mean that you will be given subject credit for these courses in the Graduate Screening Exam procedure. If you wish to obtain Graduate Screening Exam credit for a transfer course then you must pass the final exam of the corresponding course in the EE department with a grade of B or better. Your grade, for purposes of calculating your Graduate Screening Exam GPA, is the grade you received on the corresponding USC course final exam. Note that you will not be penalized if you take a USC course final exam and do not pass. However, you still must successfully complete all the Graduate Screening Exam course requirements.

## **How many students will pass the Graduate Screening Exam?**

Currently there is no maximum quota system in place at EE-EP. Any students who meet the criteria for passing will be passed. However, the total number of students who continue to progress toward their ultimate doctoral degree goals is dependent on the available research opportunities.

## **How many times can I take the Graduate Screening Exam?**

You can only take the EE-EP Graduate Screening Exam once, and the Graduate Screening Exam process must be completed within three semesters of your PhD admission date. However, please note that, since you are given considerable latitude on your Graduate Screening Exam course selection, and when to take them, effectively you are given multiple chances to do well on your Graduate Screening Exam.

## **What happens once I *summarily pass* the Graduate Screening Exam?**

You will receive an official letter within two months of the completion of your Graduate Screening Exam. Your advisor will also be notified of your completion, through a copy of the letter. You may also be directed as to the time to contact the department for discussion of the next steps of your program. This discussion includes your timeline for taking your PhD qualifying exam and your proposed program of study.

## **What happens if my Core Courses' GPA is between 3.30 and 3.70, and I meet all the other Screening Exam requirements?**

If, at the end of your initial three months period, your core courses' GPA is between 3.30 and 3.70 you will not *summarily pass* the screening exam. In this less desirable situation your progress will require detail examination by the entire EE-EP faculty, at a faculty meeting, with your PhD advisor present. In this meeting your academic progress will be reviewed, discussed, and a vote conducted to decide if you have passed or failed the Screening Exam. All this is avoided if your GPA in the core courses is equal or higher than 3.70

## **What happens if I *summarily fail* the Graduate Screening Exam?**

You can no longer progress towards the PhD and you will receive an official letter to this effect within two months of the completion of your Graduate Screening Exam. Your PhD advisor, if you have one, will also be notified of your status. You will also be directed to meet with a student services advisor regarding your terminal Master's degree.

### **After I take the EE-Systems Graduate Screening Exam and fail, can I apply to and take the EE-EP Graduate Screening Exam?**

No, once you initiate the Graduate Screening Exam process in EE-Systems, it must be completed in EE-Systems. The same is true in the reverse case.

### **If I am a MSEE student, can I get into the PhD program by successfully completing the Screening Exam requirements?**

If admitted into the MSEE program, a student may apply for admission into the PhD program based on performance on the Screening Exam requirements. However, successful completion of the Screening Exam requirements alone does not guarantee admission to the PhD program. Please see the current Chair of the Graduate Screening Exam Committee, a student services advisor, or your academic advisor, to discuss the available alternatives for your particular situation.

### **What is the purpose of the Screening Exam Committee?**

The Screening Exam Committee is appointed annually by the EE-EP Department Chair. Its purpose is to administer the EE-EP Screening Exam, monitor the progress of all PhD students, and also make decisions on specific cases not covered by this handbook. For specific information on the current members of the Screening Exam committee please contact the EE-EP main office, located on PHE 602

### **What are my resources if I have any questions or need any clarifications about the Graduate Screening Exam?**

You have several resources along the way. To exercise them you can directly contact the Chair or a member of the Graduate Screening Exam committee, a student services advisor, your faculty advisor, or another faculty member for further advice or information.

## **Section IV - Current EE-EP Faculty and their Corresponding Areas of Interest**

Below is a list of current EE-EP faculty and their areas of interest. For further information regarding their research, please review the department research booklet and visit our website at <http://ee.usc.edu>. You can also arrange to meet with a faculty advisor. Faculty office hours are listed on the PHE 6<sup>th</sup> floor bulletin boards.

<b>Faculty Member</b>	<b>Research Area</b>
Andrea Armani	Photonics, biophotonics
Mike Chen	Integrated circuits
John Choma, Jr.	Integrated circuits
Stephen Cronin	Nano optics, nanoelectronics
P. Daniel Dapkus	Quantum electronics
Martin Gundersen	Quantum electronics
Robert Hellwarth	Quantum electronics, lasers
Hossein Hashemi	Integrated circuits
Michael Fritze <sup>3</sup>	Nano- and micro-electronics technologies
Eun Sok Kim	Micro-electro-mechanical systems (MEMS)
Anthony Levi	Quantum electronics
Grace Lu	Nano technology
Bindu Madhavan <sup>3</sup>	Integrated circuits
Mahta Moghaddam	Applied electromagnetics
Ellis Meng	Biomedical microelectromechanical systems (bioMEMS), microfluidics, implantable devices
John O'Brien	Photonics
Michelle Povinelli	Photonics, applied electromagnetics
Aluizio Prata, Jr.	Applied electromagnetics
Steven Sample	Applied electromagnetics
William Steier	Laser, optical devices

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<sup>3</sup> Dean approval is needed, on a case-by-case basis, for research faculty to serve as a PhD supervisor.

Alireza Tabatabaeenejad <sup>3</sup>	Microwave remote sensing, applied electromagnetics
Armand Tanguay, Jr.	Solid State, electronic devices
Wei Wu	Nano devices, nano fabrication
Jongseung Yoon <sup>3</sup>	Photovoltaic and optoelectronic devices, and applied electromagnetics
Chongwu Zhou	Nano technology

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