General Information

Overview of Photonics Graduate Program

The Center for Optical Materials Science and Engineering Technologies (COMSET), formed in 2000, is an interdisciplinary unit of the College of Engineering and Science at Clemson University. COMSET provides an organized framework with significant centralized infrastructure for faculty with common interests to collaborate in developing advanced materials, devices and systems that generate, transmit, manipulate and utilize light. The science and engineering of light-based technologies is approaching a trillion dollar global market. With materials as the technology enabler within all devices and components, Clemson University and South Carolina, through COMSET, are uniquely positioned to support the research, work-force development and outreach needs of the industry. COMSET conducts an important blend of “what-if” basic science and more applied research with immediate deliverables in wide-ranging areas including LEDs, lasers, integrated optical devices, specialty optical fiber, light-emitting plastics, glasses and crystals.

The Photonics Graduate Program at Clemson University (“the Program”) offers Master of Science (M.S.) and Doctorate of Philosophy (Ph.D.) degrees. The M.S. program includes a non-thesis option and a thesis option. The Ph.D. program is normally entered only after completion of an M.S. degree in the same major; however, highly qualified students may be allowed to enter the program directly after completion of a B.S. degree.

This handbook defines the requirements, policies, and procedures of the Photonics Graduate Program. The requirements specified herein are in addition to those described in the Clemson University Graduate School Admissions Policies and Academic Regulations. The Graduate School policies and regulations are specified in The Graduate School Announcements and at the Graduate School Web site. It is very important that each student familiarize himself or herself with all Graduate School and departmental requirements and information pertaining to the student’s program of study. (Note in particular that the program may have additional requirements for a degree program beyond the requirements specified by the Graduate School.)

All new students are required to attend orientations held by the Graduate School to become acquainted with the instructional activities and research as well as with general regulations. Information from these orientations helps students to select specific research areas and allows them to make a more effective choice of advisory committee members. Dates and times of the orientation meetings are announced each semester.

We hope this handbook is useful both to graduate students and faculty. Any inconsistencies or omissions should be brought to the attention of the graduate program coordinator.
Personnel

The following link is a list of key faculty members involved with the graduate program along with their research interests. We encourage potential graduate students who are interested in our program to directly contact individual faculty members about the Research Assistants (RA) opportunities.

http://www.clemson.edu/centers-institutes/comset/faculty/

Contact
Graduate Program Coordinator: Lin Zhu
Graduate Student Services: Jennifer Gooch
Academic Department Chair: Daniel Noneaker
Prospective Graduate Students

Application Procedure and Requirements

To apply for our graduate program, please visit the Graduate School application at http://www.grad.clemson.edu/p_apply.html.

Admission is based on the applicant’s record of academic performance, standardized test scores, and letters of reference. Each applicant should highlight relevant work experience and detail academic goals and research interests in a written statement of purpose. Interested students may apply on the Web at http://www.grad.clemson.edu/Admission.php. Information on required undergraduate prerequisite courses can be found here.

Students who seek admission for the fall semester are encouraged to apply no later than the preceding February 1; students who seek admission for the spring semester are encouraged to apply no later than the preceding October 1; students who seek admission for the first summer session are encouraged to apply no later than the preceding December 1. The department will review applications after these recommended dates, but failure to meet these dates may significantly reduce applicants' opportunities for financial assistance.

Required application material includes the following items:

- On-line application, including Personal Statement/Statement of Purpose
- Transcripts of prior and current undergraduate and graduate course work
- Results from the Graduate Record Examination (GRE) General Test
  - GRE recommended for application to the M.S. or Ph.D. program
  - With the consent of the program coordinator, GRE can be waived for the students with extensive research experiences
- Results from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS) (for applicants whose native language is not English)
- A minimum of two Letters of Recommendation (three Letters are highly encouraged)
- A summary of related research and work experience

Completed applications will be reviewed as they are received, and there is no application deadline. Applicants are strongly encouraged to complete applications by the dates listed above, however. Failure to provide a completed application by the specified dates will significantly reduce an admitted applicant’s opportunity for financial support, and it may delay the student’s entrance until a later semester.
Financial Aid

Admission to the photonics graduate program is considered separately from offers of financial aid (graduate assistantships or fellowships). Graduate research assistantships are awarded by individual faculty members.

Accepted applicants with strong academic credentials may also be considered for a fellowship. The College of Engineering, Computing, and Applied Sciences fellowships and the Clemson University recruitment fellowships are all supplemental; they can only be awarded in conjunction with an assistantship offer. All qualified accepted applicants are considered automatically for supplemental fellowships; the applicant does not need to apply for consideration. A variety of fellowships funded by external organizations are also available (e.g., DOE, NDSEG, NSF, and SMART fellowships). Students should apply directly to the organization awarding an external fellowship.

Federal loans are another option for some graduate students in electrical and computer engineering. For more details on financial aid, please visit the Clemson University Financial Aid website.
Current Graduate Students

Selecting an Advisor

Each graduate student is admitted with a faculty advisor based upon the student's expressed interests. The initial academic advisor for each entering M.S. student is the program coordinator; the initial academic advisor of each entering Ph.D. student is the faculty member who has agreed to advise the student. The initial academic advisor should be consulted in selecting courses for the first semester of study. It is possible to change the advisor after admission into the program.

After the first semester of study, the student should select a faculty member as the permanent academic advisor for the student's program of study. The academic advisor will serve as the chair of the student's advisory committee; thus, the selected advisor's research interests and expertise should relate closely to the student's focus area of study. The advisor serves as the student's first and primary contact for planning the student's program of study and selecting courses. The advisor and the rest of the advisory committee should be determined by the end of the student's second semester of study. (Refer to M.S. committee details or Ph.D. committee details as appropriate.)

Course Selection

The student should meet with his or her initial academic advisor prior to the first semester of study to select courses for the first semester. Once the student has selected a permanent academic advisor, the student and the advisor should meet for an initial discussion of the student’s program of study; this should be followed by a meeting at least once per semester to discuss courses for the subsequent semester. The courses should be chosen so as to make significant progress towards meeting the requirements of the student's degree program. The requirements are given in later sections of the Handbook.

The student should work with his or her academic advisor to complete a GS-2 (Graduate Degree Curriculum) form. The form should list exactly those courses that are to be used to satisfy the requirements for the degree as well as the membership of the student’s faculty advisory committee. The composition of the committee depends on whether the student is enrolled in the M.S. program or the Ph.D. program; details are provided in later sections of the Handbook.

The courses listed on the GS-2 form must be approved by the student's advisory committee. The student must first select an advisory committee. Once this is decided, the student must submit the GS-2 Committee Selection in iRoar. The courses listed on the GS-2 Plan of Study form must be approved by the student's advisory committee. Once the student and the committee agree upon the courses to be included on the GS-2, the student must complete the GS-2 Plan of Study in iRoar. Automated notifications
will be sent to the Graduate Student Services Coordinator and each committee member in turn (not all at once) for approval.

Registration

Information on graduate student registration can be found at the Registrar's web site and in the Graduate School Announcements. Pre-registration is required for all graduate students. The information obtained from pre-registration is essential to plan graduate course offerings properly. Failure on the part of students to pre-register may result in course cancellations and the inability to offer desired courses. Students are strongly encouraged to register early to ensure that courses are not canceled.

Conduct of Graduate Students

Please be familiar with the following Clemson University and College of Engineering and Science policies regarding the conduct of graduate students. Photonics graduate students are expected to understand and abide by these policies.

Clemson University Academic Integrity Policy

Clemson University Non-Discrimination Policy

Clemson University Sexual Harassment Policy

College of Engineering, Computing, and Applied Sciences Honor Code

College of Engineering, Computing, and Applied Sciences on Alcohol: Alcoholic beverages are prohibited for any activity held in a College of Engineering and Sciences facility unless prior approval has been granted through University-defined procedures. Under no circumstance should alcohol be made available to or consumed by anyone under 21 years of age.
Graduate Academic Programs

Requirements of the Clemson University Graduate School

All degree requirements of the Clemson University Graduate School must be met in addition to the requirements specified in this Handbook. See the Graduate School Website for further information.

http://www.grad.clemson.edu/programs/DegreeRequirements.php

Photonics Program curriculum

For the MS program, students may write a thesis or follow a non-thesis option. The thesis option requires a total of 30 credit hours (six of which must be research credits) and the submission and defense of a master’s thesis. For the non-thesis option, 33 credit hours of coursework must be completed.

The PhD program requires at least 24 credit hours of graduate coursework and 36 research credit hours. Specially qualified candidates with a BS degree may apply for direct entry to the PhD program.

Both thesis MS and PhD students are required to take at least 18 credit hour core coursework. Non-thesis MS students are required to take at least 24 credit hour core coursework.

Core Courses:
BIOE 631 Medical Imaging
BIOE 671 Biophotonics
CH 805 Theoretical Inorganic Chemistry
CH 814 Analytical Imaging
ECE 830 Electromagnetics I
ECE 893 Fiber Sensors
ECE 893 Fourier Optics
ECE 893 Optical fiber communications
ECE 893 Lasers and Detectors
ECE 693 Photonics and Optoelectronics
ECE 893 Fiber Lasers
MSE 624 Optical Materials
MSE 825 Solid State Material Science
PHYS 632 Optics
Master of Science Program

M.S. Advisory Committee

Each M.S. student must have an advisory committee of at least three Clemson University faculty members. A majority (more than 50%) of the committee members must be Photonics faculty (the faculty affiliated with COMSET). One of the Photonics faculty on the committee must serve as the student’s academic advisor and as the chair of the committee. A committee member from outside the Photonics faculty may serve as a co-chair of the committee with the approval of the Dean of the Graduate School.

The student's academic advisor is his/her first contact in planning a program of study. The advisor, along with the student's advisory committee, will serve the following functions:

- Work with the student to determine course selection for each semester.
- Approve the student’s program of study (specified in the GS-2 form).
- Supervise the thesis research (if the thesis option is chosen).
- Administer the final examination (if the thesis option is chosen).
- Initiate recommendations for awarding the degree.

M.S. Plan of Study

The student's planned program of study, documented on the GS-2 form, must be submitted no later than the mid-term of the second semester of the program. If circumstances necessitate later changes to the plan a revised GS-2 form must be completed in iRoar.

Summary of M.S. Degree Requirements

The requirements of the M.S. degrees are as follows:

- Complete the graduate course-work requirements specific to the thesis option or the non-thesis option as detailed below.
- Complete a written M.S. thesis (thesis option only).
- Pass the final examination (thesis option only).

Click here for Graduate School deadlines.

Each student's program of study, as specified by the GS-2 form, must satisfy one of the following two options.
Thesis Option

The GS-2 form for the thesis option must include a minimum of 30 credit hours of graduate-level course work at the 600-level, 800-level, or 900-level, including the following:

- Exactly six (6) credit hours of Photonics 891 (M.S. Thesis Research)
- A minimum of 24 credit hours of letter-graded course work (at least 18 credit hours must be from the core coursework listed above).

A student electing the thesis option in the M.S. program must write a thesis that is approved by the student’s advisory committee and the Graduate School. The student must also take a final examination administered by his/her advisory committee. At a minimum, the student must pass an examination consisting of an oral defense of the student's thesis. The advisory committee has the option of administering an additional written and/or oral examination on coursework.

[Note: Each M.S. student receiving a graduate teaching assistantship or a graduate grading assistantship is required to select the thesis option. An M.S. student supported as a graduate research assistant is almost always required by his or her advisor to select the thesis option as well. M.S. students anticipating entry into the Ph.D. program are strongly encouraged to consider selecting the thesis option.]

Non-Thesis Option

The GS-2 form for the non-thesis option must include a minimum of 33 credit hours of graduate-level course work at the 600-level, 800-level, or 900-level (at least 24 credit hours must be from the core coursework listed above).

No thesis or engineering report is required with the non-thesis option, and there is no final examination.

M.S. Thesis

The M.S. thesis (required of each M.S. student electing the thesis option) must demonstrate mastery of available scholarship in the presentation of a substantive idea or problem solution in the major field of the student.

Transferring Coursework
A maximum of one third (1/3) of the required graded coursework may be transferred to an Photonics graduate program. All transfer coursework must be approved by the student’s advisor and advisory committee prior to being included on the GS-2. Coursework eligible for transfer must be: from a regionally accredited institution, graded with a B or higher, and is subject to the Graduate School’s six-year time limit for validity. Please note all limitations for transfer work set forth by the Graduate School apply. An official transcript must be available prior to transferring the coursework. Coursework applied towards the requirements of a prior degree earned by the student cannot be used for transfer credit. (If requested by the Department, the student must be able to provide verification of eligibility for each course requested for transfer.)

M.S. Coursework Expiration

All coursework for the M.S. degree must be completed in the six (6) calendar years prior to graduation as per Graduate School policy. Any course work completed before this time window may not be applied towards the requirements of the degree except under special conditions defined by the Graduate School.
Doctorate of Philosophy Program

There are two circumstances in which a student can enter the Ph.D. program in photonics. In one circumstance, the student enters the Ph.D. program with a prior M.S. degree. In the other circumstance, the student enters the Ph.D. program with only a prior B.S. degree. (Direct entry to the doctoral program from the baccalaureate is permitted only for students with an exceptionally strong academic record and exceptional potential for research as determined by the Photonics faculty during evaluation of the student’s application.)

Ph.D. Advisory Committee

Each Ph.D. student must have an advisory committee of at least four tenured or tenure-track Clemson University faculty members. A majority (more than 50%) of the committee members must be Photonics faculty. One of the Photonics faculty on the committee must serve as the student’s academic advisor and as the chair of the committee. A committee member from outside the Photonics faculty may serve as a co-chair of the committee with the approval of the Dean of the Graduate School.

The student selects the academic advisor, also chair of the committee, who, in consultation with the student, selects the additional committee members. Keep in mind that faculty members must consider their existing workloads before consenting to serve.

A student’s academic advisor is his/her first contact in planning a program of study. The advisor, along with the student’s advisory committee, will serve the following functions:

Work with the student to determine course selection for each semester.
Approve the student’s program of study (specified in the GS-2 form).
Supervise the dissertation research.
Administer the Comprehensive Exam.
Administer the final examination.
Initiate recommendations for awarding the degree.

Ph.D. Plan of Study

The student’s planned program of study, documented on the GS-2 form, must be submitted no later than the beginning of the fourth semester of the program. If circumstances necessitate later changes to the plan a revised GS-2 form must be completed in iRoar.
Summary of Ph.D. Requirements

The requirements of the Ph.D. Program are as follows:

- Satisfy any undergraduate course deficiencies specified at the time of admission.
- Pass the Ph.D. Qualifying Examination.
- Pass the Ph.D. Comprehensive Examination.
- Complete the graduate course-work requirements.
- Complete a written Ph.D. dissertation.
- Pass the final examination.

Each student's program of study, as specified by the GS-2 form, must satisfy one of the following two program options.

**Entry to the Ph.D. Program with a Prior Master’s Degree**

The student must pass the Ph.D. Qualifying Examination, pass the Ph.D. Comprehensive Examination, and write a dissertation that is approved by the student’s advisory committee and the Graduate School.

The GS-2 form for the Ph.D. degree with a prior M.S. degree must include a minimum of 42 credit hours of graduate-level course work at the 600-level, 800-level, or 900-level, including the following:

- At least 18 credit hours of Ph.D. Dissertation Research
- A minimum of 24 credit hours of letter-graded course work (at least 18 credit hours must be from the core coursework listed above).

The student must pass a final examination administered by his/her advisory committee, which includes at a minimum an oral defense of the student's dissertation. The advisory committee has the option of administering an additional written and/or oral exam on coursework, however.

**Direct Entry to the Ph.D. Program after the Bachelor’s Degree**

The student must pass the Ph.D. Qualifying Examination, pass the Ph.D. Comprehensive Examination, and write a dissertation that is approved by the student’s advisory committee and the Graduate School.

The GS-2 form for the Ph.D. degree with a prior M.S. degree must include a minimum of 60 credit hours of graduate-level course work at the 600-level, 800-level, or 900-level, including the following:

- At least 36 credit hours of Ph.D. Dissertation Research
• A minimum of 24 credit hours of letter-graded course work (at least 18 credit hours must be from the core coursework listed above).

The student must pass a final examination administered by his/her advisory committee, which includes at a minimum an oral defense of the student's dissertation. The advisory committee has the option of administering an additional written and/or oral exam on coursework, however.

Ph.D. Candidacy Requirements

A student in the Ph.D. program is classified as a “candidate for the doctorate” (or is "admitted to candidacy") upon successful completion of the Comprehensive Examination for the degree and acceptance of the GS5-D (Doctoral Candidacy) form by the Graduate School. Once admitted to candidacy, the student has five years to complete all the requirements for the doctorate.

Ph.D. Comprehensive Examination

The student's advisory committee administers this exam. The content and scope of the exam are at the discretion of the committee. The exam may be written or a combination of written and oral. This exam must be completed at least six months before the student is eligible to graduate. The GS5-D (Doctoral Candidacy) form is required for documentation of the completion of the requirement. Further details may be found in the Graduate School Announcements.

Ph.D. Dissertation

The Ph.D. dissertation must constitute an original, unique, substantive contribution to scholarship in the major field of the candidate.

Transferring Coursework

A maximum of one third (1/3) of the required graded coursework may be transferred to an Photonics graduate program. All transfer coursework must be approved by the student’s advisor and advisory committee prior to being included on the GS-2. Coursework eligible for transfer must be: from a regionally accredited institution, graded with a B or higher, and is subject to the Graduate School’s six year time limit for validity. Please note all limitations for transfer work set forth by the Graduate School apply. Coursework applied towards the requirements of a prior degree earned by the student cannot be used for transfer credit. (If requested by the Department, the student
must be able to provide verification of eligibility for each course in which transfer credit is requested.)