

## **Procedures, Rules, and Regulations**

for

### **Graduate Students**

**Effective Summer 2020**

The following is a review of various procedures and requirements for physics graduate students. It is subject to change and it does not supersede the catalog. Where there is disagreement between this and the catalog, the catalog applies. This description is meant to be helpful and indicative of practice rather than a legal description of rules.

### **REGISTRATION**

1. Professor Cremonini and Ekuma will be your academic advisors until you have a PhD dissertation advisor. Registration questions or problems can be brought to either of them. They are responsible for monitoring your progress, though all faculty members are willing to give you advice.
2. The Graduate Coordinator, Alicia Hepner, is responsible for office assignments.
3. Professor Licini is responsible for TA assignments.
4. You must register two times each calendar year. Check the catalog for deadline dates.

### **GRADES**

As you are aware, graduate students are expected to perform at a higher grade level than undergraduates. Thus, a grade of C is considered poor performance for a graduate student. There is a "4-C rule" which states that a graduate student who receives MORE THAN four C's cannot continue to register. A course in which a student receives a grade below C- does not count toward a graduate degree. A grade of incomplete (N) must be removed within 12 months of the end of the semester of registration or all equity in the course is forfeited.

## LEARNING OUTCOMES OF MS and PhD PROGRAMS

The MS and PhD programs are designed to provide an academic education in physics at the graduate level. In order to contextualize the graduate education leading to this degree, the tables below outline the learning outcomes that we expect our students to achieve at the end of their time here, classified according to the five core competencies of academia defined by the Lehigh University Graduate Research Council (GRC).

Knowledge	<ul style="list-style-type: none"> <li>Students should have knowledge of the core fields within physics: mechanics, electromagnetism, quantum mechanics, thermodynamics, and modern physics (relativity, particle physics, nuclear physics), along with many of the related fields of application (condensed matter, biophysics, astrophysics, optics, etc.).</li> </ul>
Application	<ul style="list-style-type: none"> <li>Students should know how to use analytical, experimental, mathematical, and numerical methods to solve physics problems, and qualitatively evaluate the results.</li> </ul>
Context	<ul style="list-style-type: none"> <li>Students should be able to apply physical reasoning to real-world problems, and understand the relationship between physics and related fields such as engineering and mathematics.</li> <li>Students should have a basic grasp of the historical development of physics as a discipline.</li> </ul>
Communication	<ul style="list-style-type: none"> <li>Students should be able to answer a physics exam question and respond with a clear, logical answer, showing intermediate steps of calculation and reasoning.</li> <li>Students should be able to write a paper describing a physics experiment or area of research, using clear language and proper terminology. They should be able to give a talk to an expert audience in their specialty between 15 and 60 minutes long, explaining their work and discussing its significance.</li> </ul>
Leadership	<ul style="list-style-type: none"> <li>By the time students have received an MS, they should be able to describe how research projects are conducted, evaluated, and communicated.</li> <li>By the time students have received a PhD, they should be able to conceive of a research topic in physics, design an experiment or theoretical approach to address that topic, carry out the project, and report on the results in both an article suitable for peer review and in a seminar.</li> <li>Students should understand the structure of the physics profession, in terms of the path to being a professional scientist, the relationship between government, academia, and industry, and how funding is allocated.</li> <li>Students should have some experience in a professional physics organization (APS, AAS, OSA, etc).</li> </ul>

The following table lists each of the activities that are part of the physics graduate program, and identifies how each activity contributes to either the development (D) or assessment (A) of each of the core competencies, as interpreted in the table on the preceding page.

<b>MSc and PhD students</b>					
	Knowledge	Application	Context	Communication	Leadership
Academic Courses	D, A	D, A	D, A	D, A	D, A
Subfield group meetings / seminars	D	D	D	D	D
491 Summer research	D, A	D, A	D, A		
Peer mentorship	D	D		D	D
TA position	D	D		D	D
Attending colloquiums	D	D	D	D	
Departmental service				D	D
<b>PhD students, also available to MS students</b>					
	Knowledge	Application	Context	Communication	Leadership
Writing journal articles	D, A	D, A		D, A	D, A
Conference presentations	D			D	D
Conference posters	D			D	D
Giving colloquiums / seminars	D			D	D
<b>PhD students</b>					
	Knowledge	Application	Context	Communication	Leadership
Written qualifier exams	A	A	A	A	
Oral qualifier exams	A	A	A	A	
Dissertation Proposal	D, A	D, A	D, A	D, A	D, A
General exam	D, A	D, A		A	A
Committee meetings	A	D, A	D, A	D, A	D, A



## MS PROGRAM

1. The following courses, unless an approved equivalent course has been taken previously, constitute the MS program.

PHY 369 - Quantum I (3)	PHY 420 - Mechanics (3)
PHY 424 - Quantum II (3)	PHY 421 - E&M I (3)
PHY 442 - Stat. Mech. (3)	PHY 422 - E&M II (3)
PHY 428 - Math. Phys. (3)	PHY 491 - Research (3)

plus two additional courses selected from 300 and 400 level courses in Physics or related fields. These courses must be approved by the graduate advisors. A total of 30 credit hours are required for the M.S. degree.

2. **PHY 491 Research** is a project done under the supervision of a faculty member. A student typically carries out his or her project during the summer following the first year of graduate work. The following procedure will be used to match students with faculty interested in directing a research project:

Late in the fall semester, Professor Biaggio will distribute a list of available projects. By mid-February, students will submit an ordered list of choices of prospective faculty advisors to Professor Biaggio. The actual assignments will be made based upon the student's academic record, faculty input, and other criteria.

The commitment of a faculty member and a student to a PHY 491 project does not imply any further commitment by either party to a continuation of the research project beyond the summer.

3. An **Application for Degree form** (accessed through Banner) must be completed at the beginning of the semester in which the degree is to be conferred. Instructions are found at <https://cas.cas2.lehigh.edu/content/important-forms-graduate-students>. In addition, an **MS-program form** (a copy of this form can be found in the Appendix of this document) must also be completed. The MS-program form must be downloaded from the website <https://cas.cas2.lehigh.edu/content/important-forms-graduate-students>, completed electronically, signed by either Prof. Vavylonis or Prof. Biaggio, and then taken to the Associate Dean for Research and Graduate Programs, College of Arts & Sciences for signatures, and finally brought to the Registrar's Office.

# PhD PROGRAM

## a. PhD QUALIFYING EXAMS

1. Qualifying exams will be scheduled just before the start of the spring semester. All students entering with a bachelor's degree in physics are expected to take these exams after completing one and a half years of graduate work. Students entering with a master's degree in physics are expected to take the exams just before starting their second semester of residence at Lehigh.
2. The exams presuppose course work through the first three semesters and consist of two written exams (each with two parts), and one oral exam. The material to be tested includes topics covered in core courses during the first three semesters of graduate study (Quantum I & II, Math Physics, Classical Mechanics, E&M I & II, and Stat. Mech.) as well as additional material from these areas and other areas normally mastered by PhD students at this level. Sample exams may be obtained from Marina Long, and questions can be directed to Prof. Vavylonis, chairman of the qualifying exam committee.

The exams consist of following sections:

a) Exam I:

Part A

- i) Classical Mechanics – 1 hour
- ii) Statistical Mechanics – 1 hour

Part B

- iii) General Knowledge, short answer questions – 1 hour
- iv) Mathematical Physics – 1 hour

b) Exam II:

Part A

- i) Quantum Mechanics I – 1 hour
- ii) Quantum Mechanics II – 1 hour

Part B

- iii) E&M I – 1 hour
- iv) E&M II – 1 hour

c) Oral exam - 1 thirty to sixty minute session

3. A student who does not pass the exam on the first attempt must retake the exam during the following June. The PhD Qualifying Exams may be taken only twice. (*Except, see item 5 below.*)
4. If a student (excluding first year students taking the exam as a free shot – *see item 5 below*) does well on most of the exam but poorly on one or two sections, it is possible that the student may only be required to retake those sections.
5. First-year graduate students are allowed to take a “free shot” at the written parts of the Qualifying Exam in January. If a student's score is sufficiently high, he/she will also be invited to participate in the oral examinations. A first-year student who passes both written and oral exams will have completed the qualifying exam requirements and his/her progress towards the PhD degree will be substantially accelerated. There is no penalty for not passing the “free shot.”

## **b. PhD COURSE AND CREDIT REQUIREMENTS**

In addition to courses required for the Master's Degree, the following course requirements must be satisfied in order to successfully complete the PhD program.

1. A total of **39** course credits (including the 30 course credits used for the MS program) is required for the PhD degree. The other 9 credits beyond the Masters degree courses needed to reach the 39 credit total may include any 300 or 400 level physics courses except courses that are part of the undergraduate Physics and Astrophysics major cores (301, 302, 340 and 362), graduate research courses other than 491 (i.e. 490, 492 and 499), independent study courses, reading courses, seminar courses, and GAANN courses. 300 or 400 level courses outside the department can count towards the 39 credits if they have been approved by the graduate academic advisor or by the dissertation committee.
2. Students entering with a masters degree in physics are required to take a total of 9 additional course credits, excluding the masters degree core courses and the specific courses listed in *item 1* above. The 9 credits must include the requirements listed in *items 3 and 4* below.
3. PHY 364 is required within the 39 credit total. (This requirement may be waived for students who have obtained a B+ or better in a comparable advanced undergraduate or graduate course).
4. Breadth Requirement. At least 3 credits of 300 or 400 level advanced physics course work must be passed from each of at least two of the three categories shown in the table below. One-, two-, and three-credit special-topics lecture courses will be assigned to one of the three categories by the instructor in consultation with the department chair and associate chair. Exceptions to this rule may be approved by the dissertation committee. The breadth

requirement is also included within the 39 credit total.

<b>Category 1</b> (Astrophysics, Nuclear & Particle Physics, String Theory, and Plasma Physics)	<b>Category 2</b> (Optics, Solid State Physics and Atomic and Molecular Physics)	<b>Category 3</b> (Fluids, Statistical Mechanics, Nonlinear Phenomena, and Biophysics)
AST 332/PHY 332 – High-Energy Astrophysics AST 342/PHY 342 – Relativity and Cosmology PHY 348 – Plasma Physics PHY 366 – Intro to String Theory PHY 372/PHY 472 – Advanced Nuclear & Particle Physics AST 410 –Stellar Atmospheres and Spectroscopy AST 411 – Stellar Structure and Evolution	PHY 352 – Modern Optics PHY 355 – Nonlinear Optics PHY 363 – Physics of Solids PHY 431 – Theory of Solids PHY 446 – Atomic and Molecular Physics PHY 482 – Applied Optics	PHY 365 – Physics of Fluids PHY 382 – Physics of Cells PHY 443 – Nonequilibrium Statistical Mechanics PHY 455 – Physics of Nonlinear Phenomena

- Total credit requirement. Doctoral students whose graduate study is carried out entirely at Lehigh University must register for a minimum of 72 credits beyond the bachelor's degree. Students who have earned a master's degree at another university must register for a minimum of 48 credits. These requirements are typically met by registration for dissertation or research credits, beyond the course credits. Prior to being admitted to doctoral candidacy (see candidacy requirements below) students need to register for at least 3 credits per semester, even if they have attained the 72 or 48 credit requirement.

### c. DISSERTATION ADVISOR

Normally, soon after passing the qualifying examination, a student will begin the search for a suitable dissertation topic and a faculty advisor to direct his or her research project. This will be one of the most important steps the student will take in his or her career. The actual process is similar to that of a student seeking an advisor for his or her PHY-491 research project, except that the degree of commitment on the part of both student and professor is far more significant.

The faculty will try to keep students apprised of the activities and research projects that are available in the department, but it is the student's responsibility to acquire enough information to make a choice of dissertation project. The student should talk to several professors, participate in group meetings held by some of the research groups, and consult with previous and current graduate students about their research experiences.



Although the faculty will do everything it can to provide assistance, it is each student's responsibility to identify his or her research advisor. However, individual faculty are not required to accept as dissertation students each and every student who requests to work with them, and a student/faculty collaboration on a PHY 491 research project is never a commitment by either party to a continued relationship. In addition, students who are making less than satisfactory progress may find it difficult or impossible to find a faculty member willing to direct their dissertation work. Please see appendix A for "Best Practices for Doctoral Advisors" as recommended by the GRC (Graduate Research Committee). This will give students a good idea of what to expect from their advisor.

Students are reminded that their achievements in graduate study at Lehigh can provide a substantial beginning for a very successful career in physics. Subsequent success in the job market will depend upon their accomplishments as measured relative to other young PhD's from quality programs.

#### **d. DISSERTATION COMMITTEE**

The student must form a committee in consultation with his or her dissertation advisor. In the Physics Department, the committee normally consists of the advisor (who serves as chair of the committee), three additional Lehigh physics faculty, and one professor from outside the department.

According to university rules, the minimum number of committee members is four. The committee chair must be a voting member of Lehigh's Department of Physics. At least two other committee members must also be voting Lehigh faculty members (voting defined here according to R&P as a voting member of the Lehigh faculty). With the written approval of the department and the Associate Dean for Graduate Studies, one of these two (but not the committee chair), may be drawn from categories that include departmentally approved adjuncts, emeritus faculty, professors of practice, university lecturers, and courtesy faculty appointees. Such a member must have a doctoral degree. The fourth required member must be from outside the student's department. With approval of the graduate director, PhD scientists from outside the university may serve as the outside member of the committee or even as dissertation advisor, but not as committee chair. Committees may also include additional members who possess the requisite expertise and experience, with approval of the graduate director.

It should be noted that forming a committee with only four members or choosing committee members from outside the university can lead to difficulties in scheduling mandatory committee meetings, and that such scheduling difficulties are not an acceptable excuse for missed deadlines (see below). The department strongly recommends that each committee have a minimum of five members (the advisor plus three other physics faculty and one Lehigh faculty member from outside the department). If the advisor and student want to include a scientist from

outside the university, we recommend that this individual be added as a sixth member of the committee. This committee makeup reduces the risk of being unable to assemble a legal committee for crucial meetings.

**e. PhD DISSERTATION PROPOSAL DEADLINE** - Last day of class, SPRING Semester of Year 3.

During the third year, the student will prepare a proposal for dissertation research, in consultation with his or her dissertation advisor, which will be presented in both written and oral formats to the dissertation committee. The student should prepare a list of all graduate courses taken and to be taken, including those taken at other institutions, and this should be attached to the proposal. A proposal signature sheet for the committee members should also be prepared. See the Appendix at the end of this document for templates for the signature sheet and proposal format. Once the student's dissertation advisor has approved the proposal, the written document is distributed to the committee and the oral presentation is scheduled. It is generally expected that committee members will receive the written document at least a week before the meeting.

The student's proposal for research must be signed by members of the student's committee following the oral presentation wherein the committee will assess the suitability of the project and the likelihood that the student will be able to successfully complete it.

In addition to approving the student's research plan, the committee may also require additional courses and language proficiency, as it deems appropriate.

Note that both the proposal and the General Exam (*see Sec. f below*) must be completed by the last day of class in the spring semester of year 3. Typically, the General Exam requires at least 2-3 weeks to prepare, and generally this occurs AFTER the proposal presentation. In addition, students are warned that it is often difficult to find meeting times that are acceptable to all committee members. "Scheduling difficulties" is not considered to be an acceptable excuse for missing the proposal or General Exam deadline. Thus 3<sup>rd</sup> year students are well advised to schedule their proposal meetings for January, February, and early March to allow plenty of time to also complete the General Exam by the end of the semester.

Note that if the proposal is not accepted by the committee at the first meeting, the student must schedule another committee meeting to present a revised proposal as soon as possible. Failure to present a proposal that is acceptable to the dissertation committee by the last day of class in the spring semester of year 3 results in the student being placed on departmental probation. If an acceptable proposal has not been presented to the committee and approved by the first day of class, fall semester year 4 (i.e. by the end of that summer) the student will lose his or her financial support, and will no longer be considered a student in good standing in the graduate program.

**f. GENERAL EXAM DEADLINE** - Last day of class, SPRING Semester of Year 3.

The purpose of the General Exam is to determine whether or not the student is knowledgeable in his or her chosen area of specialization. The specifics of the General Exam will be determined by the student's dissertation committee on or about the time of their first meeting (Spring, year 3).

The General Exam will be administered by the dissertation committee in a meeting closed to the public. **There is a special form for reporting the results of the General Exam** (which can be found in the appendix of this document or downloaded from the website <https://cas.cas2.lehigh.edu/content/important-forms-graduate-students>) and the student should bring a copy of this form to the exam. The student should complete all information at the top of the form before the exam. Once the committee members have indicated the results of the exam and signed the form, the completed form should be given to Marina Long in the Physics Department Office.

The General Exam will normally be completed within 1 – 1 ½ years after the student has passed the PhD qualifying exam, and usually follows the admission to candidacy. The departmental deadline is the last day of class in the spring semester of Year 3. The College deadline is no later than seven months prior to the anticipated date of graduation.

If the student does not pass the examination at the first attempt, a re-exam must be scheduled as soon as possible. Failure to pass the General Exam by the last day of class in the spring semester of year 3 results in the student being placed on departmental probation. If the General Exam is not passed by the first day of class, fall semester year 4 (i.e. by the end of that summer) the student will lose his or her financial support, and will no longer be considered a student in good standing in the graduate program.

**g. PhD CANDIDACY**

A student should file an APPLICATION FOR CANDIDACY no later than TWO YEARS after passing the qualifying exam, and preferably sooner. To apply for candidacy, the student must submit

1. A completed **Application for Candidacy** (a copy of this form can be found in the Appendix of this document). The Application for Candidacy form must be downloaded from the website <https://cas.cas2.lehigh.edu/content/important-forms-graduate-students>, and completed electronically.
2. Approved original proposal with committee signatures
3. Copy of transcript or a list of all graduate courses taken and to be taken, including those taken at other institutions. A total of **39** course credits is required for the PhD degree and the

list of courses should satisfy the course requirements outlined in *Sec. b.*

4. A signed General Exam Form or explanation from the program when this requirement will be fulfilled.

Completed applications should be sent to the Graduate Programs Office (Room 280 Maginnes Hall). Once this paperwork is processed a candidacy interview is scheduled with the Associate Dean as the final step to formally enter Candidacy.

## **h. YEARLY DISSERTATION COMMITTEE MEETINGS AND FORMS**

*DEADLINE* - Last day of class, SPRING Semester each year.

After the Proposal (see Sec. e) has been accepted and the General Exam (see Sec. f) has been passed, students must continue to hold annual dissertation committee meetings, starting in year 4. The deadline for these meetings is the last day of class of the Spring semester. Even if the student plans to have a dissertation defense in the summer, he or she must still convene a meeting of the dissertation committee during the academic year (i.e. a meeting **MUST** take place each year between the first day of class fall semester, and the last day of class spring semester

– no exceptions!). A **Report on PhD Dissertation Committee Meeting** form should be brought to the meeting (see Appendix).

## **i. FULL TIME STUDENT STATUS**

Graduate students who are on maintenance of candidacy (72 credits or above) or who are approaching maintenance, will typically register for less than 9 credits. In this case, the student is required to fill out a **Full Time Certification** form in order to maintain full time status (important for student loans and student visas among other things). A copy of this form can be found in the Appendix of this document. The Full Time Certification form must be downloaded from the website <https://cas.cas2.lehigh.edu/content/important-forms-graduate-students>, and completed electronically.

## **j. A PATH FOR Ph.D. CANDIDATES TO DISSOLVE AND REFORM A NEW DISSERTATION COMMITTEE**

Sometimes conditions arise where a student's current advisor's service as chair of the dissertation committee is no longer feasible, due to situations including health problems, personal conflict, or other circumstances to be reviewed by the department's graduate advisor in consultation with the Department Chair. This situation only applies to students who have entered Ph.D. candidacy, as outlined in section (g) of this document. If the existing committee, along with the current chair (if

available) and the graduate student, are able to unanimously approve a new committee chair, the newly selected chair immediately assumes that role.

In cases where unanimous approval of a new dissertation committee chair is not possible, members of the existing dissertation committee who are not in conflict with either the current chair (if available) or the graduate student will form an interim committee. The interim committee will select an interim committee chair from members of the physics department, in consultation with the student and research advisor (if available). If the interim dissertation committee fails to choose an interim dissertation committee chair, the Department Chair will appoint an interim dissertation committee chair. In cases when the Department Chair is in conflict, the Associate Dean for Research and Graduate Programs of the College of Arts and Sciences will appoint a new interim dissertation committee chair.

Role of the interim dissertation committee: The interim dissertation committee is composed of the new interim chair and the existing dissertation committee members who are not in conflict with either the student or the prior advisor. The role of the interim dissertation committee will be to form a new dissertation committee comprising existing and/or new members with balanced expertise who can evaluate the student's research progress and their thesis defense. Under the direction of the interim chair, the interim dissertation committee must discuss, and when necessary help guide the development of, a research plan and potential new dissertation committee composition separately with both the graduate student and prior dissertation advisor (if available). The interim committee will recommend a plan for the student towards a Ph.D. under the current or a new dissertation advisor, ensuring the rules and procedures of the physics department are followed.

Formation of a new dissertation committee: If the interim dissertation committee recommends a new committee, the interim dissertation committee will select members of a new dissertation committee including a new dissertation committee chair. The selection process will be done in consultation with the student and the former research advisor (if available). Once a new dissertation committee forms, the prior and interim committees are dissolved. If necessary, the new dissertation committee chair can rebalance the composition of the new dissertation committee by inviting additional members. Under the direction of the new dissertation committee chair, the new dissertation committee must help guide the student with the development of a research plan to continue the Ph.D. candidacy.

Conflict resolution of the ownership of intellectual property: The process for conflict resolution of intellectual property should follow the guidelines of the University policy on the intellectual property (<https://www.lehigh.edu/~policy/ip.html>). Intellectual property conflicts, if they arise, should be dealt with by informal discussion among the creators, committee members and, when necessary, by the faculty of the department, and possibly with the involvement of the Associate Dean for Research and Graduate Programs of the College of Arts and Sciences and the Associate Dean of the Graduate Student Life. When all attempts for conflict resolution fail, the Intellectual Property Review Board would come in as a last resort.

## k. PhD DISSERTATION

Research for the dissertation should be started as soon as possible. Typically, completion requires about two years of research plus a semester of writing the dissertation. There are, of course, significant variations. A MAXIMUM time limit is set by the university requirement that ALL post-baccalaureate work toward the doctorate must be completed within TEN years (SEVEN years for students entering with a Masters degree). Students are strongly discouraged from attempting to complete their dissertations in absentia. The completed dissertation must be written in accordance with style requirements established by the College of Arts & Sciences and must be submitted (in draft form) to the Associate Dean by the appropriate date (approximately six weeks before graduation; see the catalog for details). Please find deadlines and helpful tools on the Graduate Management Assistant website <http://cas.cas2.lehigh.edu/content/graduate-management-assistant>. The College of Arts and Sciences dissertation guidelines can be accessed through the "PhD Degree Graduation Manager" link on this website. Please contact MaryAnn Haller in the Research and Graduate Programs Office at 610-758-4280 or [mh0h@lehigh.edu](mailto:mh0h@lehigh.edu) to schedule your draft appointment.

After the dissertation has been revised and approved by the research advisor, copies of the dissertation should be distributed to the committee members and a FINAL EXAMINATION scheduled. **The committee should be allowed two weeks to read the dissertation and provide comments.**

## I. FINAL EXAMINATION

The **Dissertation Defense** will be administered by the PhD committee. Other faculty and students in the university may be invited to attend the public presentation of the dissertation and may participate in questioning. After the public presentation and defense, the committee (with additional invited faculty) will examine the candidate's dissertation further and, by vote of the committee members, determine whether or not the candidate passes the dissertation defense.

**FINAL DOCTORAL EXAMINATION FORM** - In addition, the University requires that a special form called **Report on the Final Doctoral Examination** be completed at this time (this form can be found in the appendix of this document or can be obtained from Marina Long and should be brought to the defense by the student). The Dissertation Committee must sign this form and other Physics faculty in attendance are invited to sign as well.

**DISSERTATION APPROVAL FORM** – In most cases, the committee members will have suggestions for corrections and revisions to the dissertation itself. A graduate student may spend anywhere from a few days to several weeks revising his or her dissertation after the dissertation defense. Once the committee members are satisfied with the final revisions to the dissertation, they must indicate their evaluation of the dissertation and must sign this form. (This is usually the front page of the dissertation.)



After the dissertation has been successfully defended and revised accordingly, the student must submit the final draft to the Associate Dean for Research and Graduate Programs for review by the Graduate Committee no later than TWO WEEKS before the degree is to be conferred.

Two unbound copies of the dissertation must be delivered to the Associate Dean for Research and Graduate Programs, College of Arts & Sciences. One of these must bear the original signatures of the PhD committee members. The candidate must pay a dissertation distribution fee and present a bursar's receipt for the payment.

Two additional unbound copies of the dissertation should also be delivered to Marina Long to be sent for binding. One of the resulting hardcover copies will be archived in the Physics Reading Room while the other copy is for the student.

### **m. CLEARANCE**

Graduate students must receive clearance from the university prior to the awarding of a degree or prior to resignation from the university. The following obligations must be satisfied:

- a. All INCOMPLETE (N) grades must be removed.
- b. The dissertation must be cleared by the Associate Dean for Research and Graduate Programs, College of Arts & Sciences.
- c. All financial obligations must be cleared with the bursar, including: tuition fees, library fines, bookstore charges, motor vehicle fines.
- d. All library books on loan must be returned.
- e. Students must turn in their student identification cards at the ID card office.
- f. The Interdepartmental Clearance Sheet must be completed and signed by the department chairperson, the Bursar, and Facilities Services officer and submitted to the registrar at least THREE days prior to graduation.

## FINANCIAL SUPPORT

Once a student has been accepted for graduate study in Physics at Lehigh, this department will do all it can to provide financial support in the manner of teaching and/or research assistantships and/or fellowships for the first five years that the student is in graduate school, provided of course that satisfactory progress is being made. Satisfactory progress will be measured by course grades, progress in the student's research project, and by the successful execution of the necessary duties required in the PhD program. (e.g. Qualifying Exam, formation of a PhD committee, proposal, General Exam, candidacy, dissertation defense.)

**Renewal of TA Appointments:** Appointments of continuing students as teaching assistants is dependent upon satisfactory performance as a teaching assistant as well as satisfactory academic performance.

**Progress Review:** Each Spring the entire faculty will review the progress of all graduate students and determine whether or not satisfactory progress is being made. In addition, petitions for support for a sixth year are reviewed at this time.

**Petitions for Extension of Support:** Students in their fifth year of graduate study at Lehigh who determine that they will not be able to complete the requirements for the PhD within the expected five years will be required to submit a petition for an extension of support for a sixth year to the graduate advisor by April of their fifth year. The form of this petition should be:

- g. A list of the items yet to be accomplished and the anticipated dates by which these will be completed.
- h. The endorsement of the student's PhD committee of the feasibility of the plan to complete all requirements within the sixth year. (In order to obtain committee endorsement, the student must convene a formal meeting of the dissertation committee prior to the April faculty meeting.)
- i. Optionally, the petition may also contain an explanation of extenuating circumstances that may have been a cause of impeded progress towards the degree.

Support beyond the sixth year will not be available except in very extreme situations.

## SUMMARY OF SCHEDULE and DEADLINES

Item	Schedule/Deadlines
PhD Qualifying Exam	1 <sup>st</sup> try: January, Year 2 2 <sup>nd</sup> try: June, Year 2*
Proposal and First PhD Committee Meeting	Deadline: Last day of spring classes, Year 3*
Admission to Candidacy	Normally just after the 1 <sup>st</sup> committee meeting. Deadline: Last day of spring classes, Year 3*
General Exam	Deadline: Last day of spring classes, Year 3*
YEARLY Committee Meetings	Once per year, beginning Year 4. Deadline:  Last day of spring classes, each year*
YEARLY progress evaluation by physics faculty	April, following last day of class
Limit of support	Five years*

Failure to meet any of the above deadlines marked by an asterisk will result in loss of the registration privilege for the next registration period and/or forfeiture of support until the problem is corrected. Students not registered will not receive any form of financial aid and upon late registration will have to pay a late registration fee to the University. Students unable to meet deadlines for truly extenuating reasons may, of course, petition the faculty for a waiver of the rule.

# APPENDIX A

## BEST PRACTICES FOR DOCTORAL ADVISORS

### Fundamental Commitment of the Advisor

- Commit to the education and development of the graduate student and fostering student development as a future member of the disciplinary community.

### Communication with the Graduate Student

- Engage in clear and open communication with advisees regarding expectations such as work hours, vacation time, sick leave, how best and how often to communicate.
- If appropriate to the field, discuss authorship and other intellectual property issues with the student and work with him/her to publish work prior to graduation.

### Academic Development

- Commit to the research project of the graduate student and help plan and direct the student's project by establishing a timeline, setting reasonable goals, and milestones.
- Help the student select a dissertation committee and facilitate meetings in order to review the student's progress.
- Strive to provide the student with access to the necessary financial resources according to my institutional and departmental guidelines assuming adequate academic progress.
- Be knowledgeable about the requirements of the graduate program and the institution; guide the students through the process.
- Provide guidance, both encouragement and constructive criticism, in a timely fashion.
- Encourage the student's creativity, intellectual risk-taking, and critical thinking.

### Professional Development

- Encourage students to attend professional meetings and strive to find travel funding.
- Write honest letters of recommendations, provide career advice, and assist with finding the student a position if possible.
- Provide opportunities for students to develop skill sets that support various career pathways.

### Interpersonal Expectations

- Not require the student to perform tasks unrelated to his/her training or professional development.
- Provide the graduate student with an environment that is respectful, emotionally supportive, safe, and free of harassment and bullying behavior.
- Respect appropriate boundaries of the advisor/advisee relationship.

## **DISSERTATION COMMITTEE MEETINGS AND FORMS**

The following pages contain a summary of dissertation committee meeting requirements, necessary official university forms, and templates for forms constructed by the student.

## Dissertation Committee Meeting Requirements

Before each meeting of your PhD dissertation, you should see Marina Long to obtain the necessary forms (or templates of forms you must create yourself) for your meeting. After each meeting, you will need to submit the completed forms and documents to Marina. She will make copies of them for the department and send the originals to the Office of the Associate Dean for Research and Graduate Programs of the College of Arts & Sciences.

- 1) **Proposal:** Your first committee meeting is generally the one where you present your dissertation proposal. Marina has a template (see following pages) to show you the format of the proposal, which must include a title page, signature sheet, comments/suggestions/requirements sheet, grade sheet, and the proposal itself. After you successfully present your proposal to your dissertation committee, you should submit the original packet of documents to Marina.
- 2) **General Exam:** Your second committee meeting is usually held soon after your proposal meeting and corresponds to your General Exam. Your advisor and dissertation committee will let you know (usually at or soon after your proposal meeting) what is the format and what is required for your General Exam. Before your meeting where you present your General Exam, you should obtain a “Report on the General Doctoral Examination” form from Marina. Fill out the form (except for the signatures of course) before the meeting and bring it to the meeting. After successfully passing the General Exam, you should submit the signed form to Marina.
- 3) Once you have completed the Proposal, you should officially “**Apply for Candidacy.**” The appropriate form should be downloaded from the College of Arts and Sciences Graduate Programs website and completed electronically. Note, if you plan to have your General Exam within a few weeks of the Proposal, you may want to wait until after the General Exam to apply for candidacy.
- 4) **Annual Dissertation Committee Meetings:** After your Proposal and General Exam meetings, you are required to have at least one meeting of your dissertation committee each academic year (between the first day of class, Fall semester, and the last day of class, Spring semester). Before each meeting, you should obtain a copy of the form “Report on PhD Dissertation Committee Meeting.” A copy is provided in this Appendix. After the meeting, the signed form should be submitted to Marina.
- 5) **Final Examination:** For your final thesis defense, you should bring two forms. The first is the “Report on the Doctoral Dissertation Examination,” which can be obtained from Marina. The second is the signature sheet indicating approval of the dissertation itself by your committee. You must make up this signature sheet yourself, but Marina can provide you with a template (a copy of the template is also provided in this Appendix). After you have successfully defended your dissertation and have obtained approval for the final draft, you should submit *copies* of these two forms to Marina. The originals should be submitted with your dissertation to the Graduate Programs Office of the College of Arts and Sciences.

## PhD Proposal Template

The PhD thesis proposal should consist of the following items:

- 1) Title page: should include title of proposal, student's name, and date. See following page for suggested format. (Note: you are free to modify the suggested formats as long as you provide the same information.)
- 2) Signature page: See following for suggested format. Note that a legal dissertation committee must consist of a minimum number of four members. Three of these, including the committee chair, must be voting faculty members in the Department of Physics (one of the three, but not the committee chair, may be a departmentally approved adjunct faculty member, lecturer, or research scientist). The fourth committee member must be from outside the Physics Department (either from another Lehigh department or from outside the university). Additional committee members (beyond the required four) can also be included and are generally a good idea. In the Physics Department, the typical dissertation committee consists of four Physics faculty and one faculty member from another Lehigh department. This composition allows you to still have a legal committee if, for example, one member of the committee is unable to complete his or her service on the committee. You should also try to avoid selecting committee members who have to travel long distances to attend annual committee meetings. Committee members need to be informed that service on the committee generally requires attendance at on-campus meetings at least once per year for ~ 3-4 years.
- 3) Comments/Suggestions/Requirements page: See following for suggested format.
- 4) Program of study for the PhD: should include courses taken and future coursework. See following for suggested format. Note that the program of study should add up to at least 72 credits (including dissertation credits).
- 5) Narrative: should include description of proposed work, proposed timeline, and references.

# Theoretical Studies of XXX

by

John J. Smith

*Graduate Research Proposal*

*Presented to the Graduate and Research Committee  
of Lehigh University*

*in Application for Candidacy for the Degree of  
Doctor of Philosophy  
in Physics*

Lehigh University

January 2018



Approved and recommended for acceptance as a proposal in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Physics

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Date

Committee Members:

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Dimitrios Vavylonis, Committee Chair

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Sera Cremonini

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Volkmar Dierolf

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Ivan Biaggio

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Anand Jagota

**Comments/Suggestions/Requirements**  
(please continue on additional sheets if necessary)

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Dimitrios Vavylonis, Committee Chair

Program for PhD – John J. Smith  
Department of Physics, Lehigh University

- BS Physics: XYZ University, May 2016
- MS Physics: Lehigh University, January 2018
- Qualifying Exam: Passed, January 2018

<u>Courses taken at Lehigh University</u>	<u>Credits</u>	<u>Grade</u>
PHY 362 – Atomic and Molecular Structure	3	A
PHY 420 – Mechanics	3	B+
PHY 428 – Methods of Math Physics	3	B-
PHY 369 – Quantum Mechanics I	3	C+
PHY 421 – Electricity and Magnetism I	3	A-
PHY 442 – Statistical Mechanics	3	A
PHY 491 – Research	3	B+
PHY 422 – Electricity and Magnetism II	3	B
PHY 424 – Quantum Mechanics II	3	A
PHY 352 – Modern Optics	3	A-
PHY 363 – Physics of Solids	3	B-
etc.		

Current courses

PHY 332 – High Energy Astrophysics	3
PHY 364 – Nuclear and Elementary Particle Physics	3
PHY 499 – Dissertation	3

Future coursework

PHY 355 – Nonlinear optics	3
PHY 499 – Dissertation	27

## Report on PhD Dissertation Committee Meeting

Student's Name \_\_\_\_\_

Date of Committee Meeting \_\_\_\_\_

Committee Members Present \_\_\_\_\_ (Committee Chair)  
(please sign)

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Recommendation of the Committee

- Committee meeting passed
- Committee meeting failed

Next Committee meeting should be scheduled for (date) \_\_\_\_\_

Comments, Recommendations, and Suggestions (please continue on additional sheets if necessary):

## **PhD Dissertation Signature Sheet Template**

The following page contains a suggested format for the dissertation signature sheet. Create a similar signature sheet for your dissertation committee and bring it to your dissertation defense along with the PhD final examination form (already filled-in by you except for the signatures).

Approved and recommended for acceptance as a dissertation in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Physics

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Date

Committee Members:

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Dimitrios Vavylonis, Committee Chair

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Sera Cremonini

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Volkmar Dierolf

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Ivan Biaggio

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Anand Jagota