

INTRODUCTION

This document is designed to provide some of the basic curriculum and teaching related information you will need as you begin your graduate program in the Department of Physics and Astronomy. But please remember you will not find all you need to know here. You are encouraged to talk to other members of the department, particularly other graduate students. They will be able to answer many of your questions as well as share with you some of their own experiences as a graduate student, graduate teaching assistant or graduate research assistant.

The information in this booklet is divided into six sections. Academic matters are discussed in Section I, teaching related material appears in Section II. Sections III, IV and V provide a list of departmental personnel. Section VI contains miscellaneous information about the physics department and university which may be helpful. An appendix of necessary forms and some other vital information concludes the handbook.

Welcome to the University of Louisville Department of Physics and Astronomy. We hope your time with us will be mutually rewarding.

Dr. Gamini Sumansekera
Graduate Program Director

P.S.: The major portion of this graduate handbook was written by Professor C.L. Davis, the previous Director of Graduate Studies

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I. ACADEMIC MATTERS

A. Introduction

All of our students are enrolled in the Doctor of Philosophy in Physics and Astronomy, the two-year program leading to the Master of Science in Physics and Astronomy or the 5-year BS/MS program. Details of these programs are described in the following sections.

In addition to the specific program requirements described below there are requirements of the Graduate School and the College of Arts and Sciences (A&S) applicable to all graduate degrees. These may be found in the Graduate School on-line catalog <http://louisville.edu/graduatecatalog> and the A&S Graduate Student Handbook <https://louisville.edu/artsandsciences/academics/graduate-education/student-handbook>. (A copy of the relevant Graduate School catalog pages and A&S minimum guidelines is included in the Appendix at the end of this handbook).

One of the most important requirement to note is that relating to grades. A GPA of 3.0 or better must be maintained and no more than six hours of coursework with grade C⁺ or lower can be counted towards the degree requirement. You should also be aware that both GTA and GRA positions require the student maintain full-time student status. This means you must register for at least nine credit hours of graduate courses during the Fall and Spring semesters. If your GTA/GRA position is a 12 month position you must also register for at least six hours in the Summer. Once in PhD candidacy full-time status is achieved by registering for Doctoral Candidacy three times a year – Fall, Spring and Summer.

B. MS Formal Program Requirements

The Department of Physics & Astronomy offers both thesis and non-thesis options. Specific requirements for the MS degree are as follows:

		Credit Hours	
		Thesis	Non-thesis
Core Courses 12 hours	Phys 605 – Theoretical Mechanics	3	3
	Phys 611 – Electromagnetic Theory I	3	3
	Phys 621 – Quantum Mechanics I	3	3
	Phys 622 – Quantum Mechanics II	3	3
Electives	Physics elective courses numbered 500 and above	6-9	12-15
	Courses in one minor field	3-9	3-9

Research	Phys 699	6	3
	Total credit hours required	30	33
	Credit hours required above 600 level	21	17

- Elective courses are chosen after consultation with the student's thesis advisor and the Graduate Program Director.
- Courses outside the department are selected with approval of the student's thesis advisor and the Graduate Program Director.
- The thesis examination committee must comprise a minimum of 3 A&S graduate faculty. The majority of the members must be Physics and Astronomy faculty, but at least one must be from a different department.

C. PhD Formal Program Requirements

1. Course Requirements

		Credit Hours
Core courses 21 hours	Phys 561 - Mathematical Physics I	3
	Phys 605 - Theoretical Mechanics	3
	Phys 611 - Electromagnetic Theory I	3
	Phys 621 - Quantum Mechanics I	3
	Phys 622 - Quantum Mechanics II	3
	Phys 625 - Statistical Mechanics	3
	Phys 650 Research Methods for Physics and Astronomy	3
Electives	Chosen after consultation with the student's thesis advisor and the Graduate Program Director.	At least 9
Research Training	Phys 699	At least 6
	Total credit hours required	At least 36

- Elective courses outside the department are acceptable with approval of the student's thesis advisor and the Graduate Program Director.
- Physics 650 is offered only on a Pass/Fail basis.
- The Graduate School requirement of at least half the credit hours at the 600 level or above must be satisfied.

2. Qualifying Examination

In order to demonstrate proficiency in knowledge of Physics and the ability to apply that knowledge, students will be required to pass a qualifying exam. The qualifying exam is comprised of the written examination and the proposal defense.

a. Written Examination

The purpose of the written examination is to evaluate the student's preparation in physics for independent research. It consists of 4 papers one each in the core topic areas of Mechanics, Electricity and Magnetism, Thermal Physics and Quantum Mechanics. ***To pass the written part of the qualifier a student must pass all 4 papers, but not necessarily at the same sitting.*** Students are only required to take those papers they have not yet passed. Each paper will include one basic question (35 points) at the freshman/sophomore level and one intermediate question (65 points) at the junior/senior undergraduate level. The format and duration of the papers is described below.

	Subject Area	Duration
Paper A	Classical Mechanics One basic and one intermediate level question	100 minutes
Paper B	Electricity and Magnetism One basic and one intermediate level question	100 minutes
Paper C	Thermal Physics One basic and one intermediate level question	100 minutes
Paper D	Quantum Mechanics One basic and one intermediate level question	100 minutes

As indicated above, these papers will be pitched largely at the undergraduate level. UofL Physics courses and representative textbooks for each of the subject areas are provided in the following table.

Subject Area	UofL course & Representative Textbook	
	Basic Level	Intermediate Level
Classical Mechanics	Halliday & Resnick Physics 298	Thornton & Marion Physics 460
Electricity and Magnetism	Halliday & Resnick Physics 299	Wangsnest, Griffith Physics 541-2
Thermal Physics	Halliday & Resnick Physics 298	Kittel Physics 530
Quantum Mechanics	Eisberg & Resnick Physics 300	Griffith Physics 555-6

- The written examinations will be offered twice a year, shortly after the beginning of each of the Fall and Spring semesters.
- A maximum of 3 attempts at the written exam are allowed. *Attempting any paper at any of the offerings constitutes an attempt at the written qualifier.*
- All full-time students must pass the written part of the qualifying examination by the end of their 3rd semester. This means that to take advantage of the allowed 3 attempts you must take the exam every time it is offered in your first three semesters. Exceptions to this requirement **may** be considered in extreme circumstances.
- The 3 attempt limit also applies to part-time students. These students are not required to pass the written part of the qualifying exam by the end of their 3rd semester. However, they are bound by the limitation of that no more than 18 credit hours, following the completion of the PhD course requirements, can be taken before entering candidacy (see below). Effectively this can relax the requirement of consecutive attempts at the written exam. Contact the Graduate Program Director for further guidance.

In each paper, in order to achieve a passing grade, we expect a student to correctly answer the basic question and make a significant attempt at the intermediate question. The score required to pass will vary from year to year, depending on the difficulty of the test, but typically a score of 65% or higher will earn a passing grade. As soon as possible after the examination students will be informed of their pass/fail status in each paper.

If, after three attempts, a student has passed at least two papers, he/she may be offered the opportunity to pass the remaining papers through oral examinations. In order to “qualify” for an oral examination in a particular paper the student must have shown a modicum of competence in that subject in previous attempts at the written examination. We anticipate a score of greater than 40-45 % will satisfy this requirement. If a student meets this requirement without passing the paper it will be reported as an “F*” in the examination results. A separate oral examination will be scheduled for each missing paper. Oral examinations will be administered by committees of three faculty members and will be scheduled as soon as possible after the results of the written examination are available.

Under normal circumstances a full-time PhD student will know whether they have passed the written part of the qualifying exam before the end of their third semester. For Fall entry students this means the end of their second Fall semester. For unsuccessful students this allows plenty of time to consider other options following the completion of two years at UofL.

b. Proposal Defense

To satisfy this component of the qualifying exam the student must present an oral defense of their proposed dissertation research. This presentation will be reviewed by the student’s proposed PhD dissertation committee. In normal circumstances, the Proposal

Defense committee will have the same members as the dissertation committee. This committee must be approved by the Department of Physics & Astronomy, the College of Arts & Sciences and the Graduate School by completion of the Thesis Dissertation Advisory Committee Appointment form (<http://louisville.edu/artsandsciences/academics/graduate-education/files/ThesisDissertationAdvisoryCommitteeAppointmentFormrev12022019.pdf>). The composition of the committee must satisfy the guidelines described in the Dissertation section below. To pass the exam the student will be expected to answer fundamental questions in the area of their research as well as questions specific to their particular topic. This exam must be passed before the student can move into candidacy status and will typically be taken before the end of their fifth semester as a graduate student. A student may have at most two attempts to pass the Proposal Defense which should be completed at the latest by the end of the sixth semester.

3. Candidacy

Once a student has passed both parts of the qualifying examination *and* passed all the required formal courses, he/she is classified as a Doctoral Candidate. ***All PhD students can take no more than 18 additional credit hours after completion of the PhD course requirements before entering candidacy.*** As a Doctoral Candidate, in order to maintain student status, he/she must register for doctoral candidacy every semester (including the summer) until completion of the degree. Although a student must complete all ***required*** courses before entering Degree Candidacy, students have the option of taking additional specialized courses, e.g. courses offered by visiting or new faculty, while in Degree Candidacy (in those cases payment of both the candidacy fee and the course tuition will be required).

4. Dissertation

A doctoral dissertation is required of each student before the PhD can be conferred. The doctoral dissertation must be completed and successfully defended no sooner than 9 months and no later than 4 years of being admitted to doctoral candidacy. The doctoral dissertation committee must be comprised of a minimum of 4 members (all of whom must be members of the A&S graduate faculty). The candidate's major professor and the majority of the committee members must be from Physics and Astronomy, but the committee must also include at least one member from a department other than Physics and Astronomy. See the section on Degree Requirements in the excerpts from the Graduate School catalog in the Appendix for other specific details regarding doctoral requirements.

D. PhD and MS Departmental Requirements

In addition to the formal requirements listed above there are certain "informal" departmental requirements we have found necessary to implement. For the "typical"

physics graduate student these requirements should pose no additional burden. However, experience has shown us that these requirements need to be clearly stated at the outset in order to avoid confusion at a later date.

1. Physics Electives

Courses required for the BS in Physics will not normally count as physics electives. Practically, this excludes PHYS 530, 541, 542, 555, and 556. Exceptions to this rule will be considered on a case to case basis by the Graduate Program Director .

2. Independent Study

Independent study provides the means by which a student can receive instruction in a subject not being offered as a “formal” course. However, in order to ensure that all students sample a varied selection of elective courses and to ensure that elective courses offered by the department achieve sufficient enrollment, a restriction is placed on independent study. A student will not normally be allowed to count more than three hours of in-department independent study (PHYS 501, PHYS 502 or PHYS 690) and three hours out of department independent study towards the MS and PhD degrees. Exceptions to this rule will be considered on a case by case basis by the Graduate Program Director.

3. Research

Prior to the completion of required course work, registration for no more than three hours of graduate research (PHYS 699) in the Fall and Spring semesters is the departmental norm. In certain situations, for example, during an MS student’s final semester, registration for six hours of research *may* be allowed. For GTA/GRA students on 12 month contracts, not yet in PhD candidacy, you will likely maintain your full-time status with six hours of 699 in the summer.

4. Elective Courses Outside the Department

The MS formal course requirements call for 3 - 9 hours of minor field study. While Mathematics or an Engineering discipline is the usual minor field choice, courses in a different field may be chosen in some circumstances. The PhD does not *require* any courses outside the department, however, if you wish to earn an MS on the way to your PhD you will be required to take a minimum of one course outside the department. If you have a thesis advisor his/her signature must be obtained on the “Proposed Course Schedule” form before any minor field course will be approved. Courses in the minor field are normally taken in the second year of study, with no more than one course in any term.

5. Additional Courses

The normal GTA course load is 9 credit hours per semester. These courses, along with the responsibilities of being a GTA, provide most students ample opportunity to keep busy. Any desire to take an additional course must be discussed with the Graduate Program Director as well as your thesis advisor. In all such cases the student must remember that degree related courses take priority. Only in exceptional cases will a student be allowed to take an additional course during the first semester of study.

6. Pass/Fail Option

The Pass/Fail grading option is not allowed for core courses, except for Physics 650 which is only offered on a P/F basis. It may be allowed in other courses, by agreement with the instructor, Graduate Program Director and (if applicable) thesis director.

7. Departmental Colloquia

Departmental colloquia are normally scheduled for Friday afternoons during the Fall and Spring semesters. The colloquia vary vastly, both in content and complexity, but in all cases form a part of your education and as such **your attendance is mandatory**. Formal attendance records may be kept; your absence will be noted and dealt with accordingly.

E. PhD and MS Suggested Curricula

All graduate students enter the department with varying backgrounds, abilities, and interests. Therefore it is impossible to devise a single program which would suit every individual. Nevertheless, given the program requirements and departmental limitations on the number and frequency of offered courses, it is possible to describe typical curricula for a well prepared student entering the program with a BS in Physics.

1. MS suggested curriculum

1st Year - Fall	1st Year – Spring
605 - Theoretical Mechanics 621 - Quantum Mechanics Physics Elective	611 - EM Theory I 622 - Quantum Mechanics II Physics Elective
2nd Year – Fall	2nd Year – Spring

699 - Research or Physics Elective Physics Elective Minor Field I	699 - Research or Physics Elective Physics Elective Minor Field II or Physics Elective
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2. PhD suggested curriculum

1st Year - Fall	1st Year - Spring
561 – Mathematical Physics 605 – Theoretical Mechanics 621 – Quantum Mechanics I	611 – EM Theory I 622 – Quantum Mechanics II 625 – Stat. Mech. or Physics Elective
2nd Year - Fall	2nd Year - Spring
Physics Elective Physics or Out-of-Dept Elective 699 – Physics Research	625 – Stat. Mech. or Physics Elective 650 – Research Methods 699 – Physics Research
3rd Year – Fall/Summer	3rd Year - Spring
Oral Proposal Defence Dissertation Research	Dissertation Research
4th Year - Fall	4th Year - Spring
Dissertation Research	Dissertation Research
5th Year - Fall	5th Year - Spring
Dissertation Research and Writing	Complete Dissertation Graduation

Note that the above are only representative examples. The courses taken, and when they are taken, will be decided on an individual basis after consultation with the departmental graduate advisor, and for “thesis” students, their thesis advisor. In addition, in order to maintain full-time status, GTAs and GRAs on 12 month contracts are required to register for six hours during the summer. As stated previously, since formal courses are rarely offered in the summer, these six hours will usually be in the form of Research (699). Once a student enters PhD candidacy, usually before or during the Fall of their 3rd year, registration as a PhD candidate is required three times a year (Fall, Spring and Summer) until completion of their degree.

F. Advising

1. Selection of courses

A complete listing of the courses offered by the University for the current academic year may be found in the "Schedule of Classes" at the University Registrar's web site, <http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>. Prior to registration for Fall, Spring and Summer classes, all graduate students - new as well as returning - must be "advised" by the Physics Department Graduate Program Director.

In the case of new students this consultation will take the form of a discussion of the type and level of the most recent courses taken as an undergraduate. The aim is to determine the student's current academic level in order to ensure that the courses taken are appropriate for that student. For example, an incoming student with a degree in electrical engineering may have a weak quantum mechanics background. In this case he/she would be advised to take at least one semester of the introductory 500 level quantum mechanics before beginning the 600 level quantum mechanics course sequence. In every case the courses to be taken in the first semester will be decided during that meeting.

For continuing students the procedure is as follows. After consideration of degree requirements, courses offered and personal preferences, the student presents his/her list of proposed courses to the graduate advisor by completing the "Proposed Course Schedule" form. That list will either be approved or alternatives suggested based upon the formal and informal requirements listed above. Students who have a thesis advisor follow a similar procedure. However, in these cases, the initial discussion (and approval of courses) takes place between student and the thesis advisor. The completed form is then given to the Graduate Program Director who checks that the courses chosen are consistent with the timely completion of the chosen degree. A copy of the "Proposed Course Schedule" form can be found at the end of this handbook.

IMPORTANT: Consultation with the Physics Graduate Program Director is **mandatory** for all Physics graduate students prior to registration every semester. After consultation, the Graduate Program Director will remove the "advise hold" from your registration record. Until this "hold" is removed the registration system should not allow you to register.

When should you register and be advised? For the Fall and Summer semesters returning students will be advised and register during early registration at the end of the Spring semester. New students will be advised and register the week before Fall classes begin. For the Spring semester you will be advised and register during the early registration period, usually sometime in November. The Graduate Program Director will be available at appropriate times for advising, but it is your responsibility to be advised and register.

It is worth noting that the MS Degree requires 30 – 33 credit hours of courses. Maintaining full-time graduate student status (a requirement of GTA employment) demands a minimum of 9 credit hours per semester (excluding summer). This produces a total of at least 36 hours over two years. For 12 month GTAs you must take an additional 6 hours in the Summer semesters. Therefore, in two years all GTA students will take at

least 3 - 6 hours more than is required for the MS degree. Thus, there is ample opportunity to take refresher or remedial courses, where necessary, without compromising the two year MS timetable. Students not needing refresher/remedial courses will be expected to take at least one additional 3 credit hour physics elective as part of the additional 3 - 6 credit hours. It is possible for PhD students to satisfy the minimum credit hour requirement for the degree in two years as a GTA.

2. Thesis advisor choice

PhD students, and MS students who opt for the thesis option, must select a thesis advisor. The work done toward a thesis is formally recognized by registration in PHYS 699. A total of 6 hours of PHYS 699 is the minimum requirement for both the PhD and MS. With the present structure of the MS program, thesis option students may end up registering for as many as 21 hours of PHYS 699 during their two-year stay. See the example curriculum above for an indication of when 699 is usually taken. Note that faculty may defer their grading of 699 until completion of the thesis.

Upon entry to the department the formal assumption will be made that no student has decided their chosen research area. It is departmental policy that this decision **must not** be made officially during the first semester. This policy is enforced so that the students have the opportunity to get to know the research areas of faculty members. However, the choice of thesis advisor and research area **must** be made before the end of the second semester. As soon as this decision is made, the form notifying the graduate advisor of thesis advisor selection must be completed. (A copy of the form can be found at the end of this booklet). Graduate students are encouraged to talk to as many faculty as possible in order to find out exactly what the department offers in the way of research projects. Please do not be reticent in this regard. Most faculty are more than happy to describe their research (often at great length) to anyone who will listen. In order to ensure that students are aware of all the possible research options available in the department first year students are required to complete the “*Exploration of Graduate Student Research Opportunities*” form (<http://www.physics.louisville.edu/cldavis/handbook/ExpStuResOpp.pdf>) and return to the Graduate Program Director before the end of their first semester.

Do not allow yourself to be pressured into making a decision in choosing a research group or dissertation topic. Within the research areas existing in the department, as far as possible, the choice of thesis research and advisor is **yours**. But remember, if you are choosing a PhD advisor it is critical that the advisor is willing and has sufficient funds to support you once the normal two year GTA funding is exhausted. If you feel that undue pressure is being applied to choose a particular thesis advisor do not hesitate to bring this matter to the attention of the Graduate Program Director. Find out exactly what a thesis advisor has in mind for you to investigate before committing to that advisor. Is there a guaranteed thesis at the end of the road? Can the proposed research be completed in a reasonable time? The department offers no guarantee of financial support to GTA students beyond the initial two years. Talk with other graduate students. Is the faculty member reasonable in his/her dealings with graduate students? Do students usually complete their

thesis in a reasonable time frame with that advisor? Obtain as much information as possible before making your decision.

3. MS Non-Thesis Option

An MS student who chooses the non-thesis option clearly does not need a thesis advisor. Unless you submit the thesis advisor selection form, the assumption will be made that you are pursuing the non-thesis option.

When choosing the non-thesis option be aware that you are *required* to take 3 hours of graduate research (699). You may have the option of taking more than 3 hours, but only 3 hours can be counted as credit towards your degree. This means you will be required to take at least 2 hours of elective courses at the 600 level or above to meet the 17 hour minimum requirement.

The choice of the thesis/non-thesis option is not irrevocable. For example, you may start out intending to write a thesis, but find that for some reason this is impossible. Provided the required courses can be accommodated it is usually possible to switch to the non-thesis option. Similarly, provided a prospective thesis advisor agrees, it may be possible to change from the non-thesis to thesis option.

As long as one elective course is out of department, after two years of full-time study, a PhD student will normally meet the requirements of the non-thesis MS option. If you find yourself in this situation we encourage you to apply for the MS degree.

G. Graduation

In order to graduate you must meet the requirements appropriate to your chosen degree. Graduation can take place at the end of any of the three semesters, Fall, Spring and Summer. For MS students entering the program in the Fall semester it is hoped that you will complete your program at the end of your second Spring semester. However, in some cases graduation may be delayed by one or more semesters. For example, a student writing a thesis may need the additional time provided by a second Summer semester at the end of their second year. In this case the student would graduate at the end of the Summer semester. For PhD students the expectation is that you will complete the degree in no more than 5 years.

Whichever semester you choose to graduate, you must submit a graduation request (on-line) to the registrars office in the semester at the end of which you intend to graduate. There are official deadlines you need to check up on. Also, you must be officially registered as a student the semester in which you graduate. In most cases this will not be an issue. If you are graduating in the Spring semester, you will typically have been taking courses that semester. However, if you choose to graduate at the end of the Summer

semester, you must make sure you are enrolled in at least one formal course or Doctoral or Master's Candidacy (which is equivalent to a course for this purpose).

For PhD students (and MS students taking the thesis route) there are number of requirements and deadlines which must be satisfied in the final weeks before your thesis defense. Each semester the Graduate School lists an absolute deadline by which completed dissertations must be submitted; typically this date is close to the last day of the semester. This is the date which will determine the latest date you can defend your dissertation and thus indirectly when you must have a written copy of the dissertation available for your committee.

The following procedure is suggested:

- (i) In consultation with your advisor and committee, decide on a dissertation defense date no later than one week before the Graduate School submission deadline. This allows you to make any corrections demanded by your committee, following your defense and still meet the submission deadline.
- (ii) Provide your committee and the department chair a substantially complete version of your dissertation at least two weeks before the defense date. It is your responsibility to have your advisor, committee members and the department chair sign the *Request to Schedule Final Oral Defense* form (http://www.physics.louisville.edu/cldavis/handbook/RequestToScheduleOralExam_Form.pdf) when you give them a copy of your dissertation. The completed form should then be submitted to the Graduate Program Director. In order for your thesis defense to be officially scheduled, the Graduate Program Director must inform the Graduate School of the date/time/location etc. at least two weeks before the defense. The GPD will not request the official scheduling of your defense until the *Request to Schedule Final Oral Defense* form is received.

The bottom line is that you need to have a substantially complete version of your dissertation approximately four weeks prior to the Graduate School's submission deadline.

II. GTA MATTERS

A. Introduction

The graduate teaching assistant is in the somewhat unique position of being both student and teacher. The responsibilities and requirements of a GTA as a student have been detailed in the previous pages. The following is an attempt to describe the basic responsibilities and requirements of the graduate student in the role of teacher.

B. Competency

All students awarded a GT Assistantship are considered technically competent to execute the responsibilities of a GTA. The University requires a further test of competency for students whose native tongue is not English. You will receive details regarding this testing procedure shortly after your arrival. Very briefly, you will be required to make a short, physics related presentation in English (of course) to a group of non-physics faculty. You will be asked questions in an attempt to simulate student/GTA relationship. Your performance will be evaluated and the results transmitted to the Physics Department. This process is in no way intended to be punitive. However, it is extremely important that you prepare adequately and perform to the best of your ability in this test. If your evaluation is unsatisfactory you will not be allowed to perform any GTA duties which involve direct student contact. This means that your GTA assignment will be exclusively grading rather than laboratory instruction. This restriction can also make it difficult for the department to cover all laboratory instruction. Therefore, please take this test seriously !!

C. Assignments

Your responsibilities as a GTA will consist of undergraduate laboratories, grading or tutoring, or a combination of the three. The normal Fall and Spring semester workload is four assignments, each of which should take no more than 5 hours of your time per week. Assignments can be responsibility for one lab section, grading for one class or tutoring. Summer semester workloads are variable, see below. You will receive your assignment from the Graduate Program Director no later than the end of the first week of each semester. It is your duty to contact the instructor or supervisor who will be in charge of your tasks as soon as you receive your assignment. You must do this **as soon as possible**. Most laboratory and grading duties do not begin until the second week of the semester, but do not assume this is the case until you have contacted your lab/grading supervisor.

D. Responsibilities

1. Laboratories

The specifics of your responsibilities as laboratory supervisor will be described in detail by the instructor in charge of that lab. However, all labs carry with them some basic requirements. First and foremost, remember that the students in the lab have paid for the privilege of taking the lab. You should endeavor to give them "value for money." This means any presentations or explanations should be clear and concise and all questions answered courteously. Do not make assumptions about the students' knowledge. In all likelihood this will be the first time most of the students have been exposed to whatever it is you are presenting. As an overlapping principle, treat each student with respect.

2. Grading

If you have been assigned grading duties, once again, the details of your responsibilities will be covered by the instructor for whom you are grading. Listen carefully to the instructions you are given and complete the work in a conscientious and timely manner. This is especially true at the end of semesters when faculty are under a strict deadline to submit final grades.

3. Tutoring

Depending on the availability of manpower, you may be assigned tutoring duties in the Physics Learning Center (PLC). When open, the PLC provides "drop-in" tutoring to students enrolled in Physics classes below the 400 level. If you are assigned these duties you are expected to make yourself available in the PLC to any student requesting assistance. If there are no requests for assistance you are free to do your own work, but you must not leave the PLC. Note that one lab assignment is equivalent to 5 hours in the PLC. Specific instructions to those students assigned PLC duties will be provided by the Graduate Program Director or another member of the Physics faculty.

4. Practical aspects

Always arrive prepared and with plenty of time to spare for your lab assignments. This may mean spending several hours in preparation. Remain in the laboratory room until all the students are gone. Do **not** leave the class unattended for even a short amount of time. Student grades are confidential. **Never** discuss a student's grades within earshot of other students. Also, **never** give a student his/her grade over the telephone or via email. This violates the Family Education Rights and Privacy Act (FERPA) of 1974.

E. Evaluation

Your performance as a GTA will be evaluated periodically by the supervising faculty member each semester. The result of this evaluation together with your involvement in departmental activities, e.g. regular attendance at departmental colloquia and participation in SPS will be used to determine whether your GTA will be continued for a second year.

Please be aware that College of Arts and Sciences regulations state that a Graduate Teaching Assistant placed on academic probation will forfeit their assistantship.

F. Summer Assignments

Most of the department's GTA positions are 12 month positions. The 12 month GTA requires that you are available for GTA duties in the summer months (June and July). The department offers a limited selection of undergraduate courses and labs in several summer sessions. Summer GTA duties will include supervision of the labs, grading for the courses and a limited PLC schedule in exactly the same manner as the Fall and Spring semesters. As far as possible the schedule will be constructed to allow GTAs to take at least one month of vacation.

G. Graduate Research Assistants

Graduate Research Assistants (GRAs) typically do not have teaching duties. The specific duties of GRAs are decided in consultation with the faculty mentor providing the support. These duties will involve contributing to the research activities of the mentor, a part of which will normally lead to the student's PhD thesis. Most PhD students in their third and successive years will be supported as GRAs. MS students and PhD students in their first two years are rarely supported as GRAs.

III. PHYSICS FACULTY

A. Professors

C. S. Jayanthi (Department Chair)	Theoretical and Computational Materials Science NS 102C 852-6790 SRB 243 852-0890 csjaya01@louisville.edu
David N. Brown (on leave of absence)	Experimental High Energy Physics NS 204 852-0920 NS 017 (lab) 852-0929 NS 019 (lab) 852-0929 david.brown@louisville.edu
Chris L. Davis	Experimental High Energy Physics NS 205 852-0852 c.l.Davis@louisville.edu
Timothy E. Dowling	Atmospheric Physics NS 201 852-3927 NS 119 (lab) 852-1180 dowling@louisville.edu
John F. Kielkopf	Experimental Atomic, Molecular, and Astrophysics NS 001 852-5990 NS 006 (lab) 852-5990 kielkopf@louisville.edu
Sergio B. Mendes	Experimental Condensed Matter Physics SRB 240 852-0908 SRB 212 852-0887 SRB 222 852-0898 sbmend01@louisville.edu
Gamini Sumanasekera (Graduate Program Director)	Experimental Condensed Matter Physics Ernst Hall 314 (office)852-1558 Ernst Hall 306 (lab) 852-4994 Ernst Hall 307 (lab) 852-4994 NS 202 gamini.sumanasekera@louisville.edu

Gerard Williger Astrophysics
NS 206 852-0821
Gerard.williger@louisville.edu

Ming Yu Theoretical Condensed Matter Physics
SRB 242 852-0931
m0yu0001@louisville.edu

B. Associate Professors

Swagato Banerjee Experimental High Energy Physics
NS 210 852-0915
NS 019 (lab) 852-0929
Swagato.banerjee@louisville.edu

Jian Du-Caines Atmospheric Physics
NS 208 852-0919
Jian.du@louisville.edu

Benne Holwerda Astrophysics
NS 133 852-0918
Benne.holwerda@louisville.edu

Jim Lauroesch Astrophysics
NS 203 852-1394
jtlaur01@louisville.edu

Shudun Liu Theoretical Condensed Matter Physics
(Undergraduate Program NS 209 852-0930
Director) s0liu001@louisville.edu

Serban Smadici Experimental Condensed Matter
NS 003 852-0853
Serban.smadici@louisville.edu

C. Assistant Professors

D. Professors Emeriti

E. Adjunct and Term Professors

E.1 Term Professors

Raymond Chastain Physics Education
NS 135 852-2918
rjchas01@louisville.edu

Ajith Rajapaksha Physics Education
Rarath01@louisville.edu

E.2 Adjunct Professors

Victor Henner Theoretical High Energy Physics
NS 310 852-0855
Vkhenner@yandex.ru

Jinjun Liu Chemical Physics
j.liu@louisville.edu

Lutz Haberzettl Astronomy
Lutz.haberzettl@louisville.edu

Frank O. Clark Atomic Physics
Frank.clark@gmail.com

F. Post - Docs

IV. PHYSICS DEPARTMENT STAFF

Rea Diehlmann

Unit Business Manager
NS 105 852-0857
rea.diehlmann@louisville.edu

Joshua Rimmer

Coordinator, Physics Technical Services
NS 002 852-0655
joshua.rimmer@louisville.edu

Lutz Haberzettl

Systems Programmer II
NS 137 852-1986
lghabe01@louisville.edu

Tatyana Tarakanova

Lab Coordinator
NS 307 852-0933
tatyana@louisville.edu

Missy Klotz

Staff/Program Coordinator, Senior
NS 102B 852-6787
kmklot01@louisville.edu

V. GRADUATE STUDENTS

(The GTA's Office is NS 125, phone number 852-3506.)

A. MS & PhD Students Expected to Enter Fall 2021

Stanford Broadwater

Kyle Cook

Stacy Hicks

Bimal Nepal

Wade Roemer

Zane Ronau

Dominic Smith

Saif Almutairi

Aljeailan Huda

B. Returning MS and 2nd Year PhD Students

Aswad Alhassan (Theoretical Condensed Matter – Yu)

aswad.alhassan@louisville.edu

Maurice Tiotsop (Theoretical Condensed Matter – Yu)

Maurice.tiotsop@louisville.edu

January Cumbea (Astrophysics – Holwerda)

january.cumbea@louisville.edu

Hiruni Weerahenedige (Experimental Condensed Matter – Sumanasekera)

hiruni.kumari@louisville.edu

John Pritchard (Astrophysics – Williger)

john.pritchard@louisville.edu

Clayton Robertson (Astrophysics – Holwerda)

clayton.robertson.1@louisville.edu

Fatimah Alquarni (Experimental Condensed Matter – Sumanasekera)

fatimahabdulrahmanm.alqarni@louisville.edu

Abdulaziz Alfarhood (Experimental Condensed Matter – Sumanasekera)

abdulaziz.alfarhood@louisville.edu

Ahmad Nagab Alharbi

ahmad.alharbi@louisville.edu

Ali Al Radhwan
alisaleha.alradhwan@louisville.edu

C. Returning PhD Students 3rd Year and Later

Rosemary Fasullo (Astrophysics – Kielkopf)
Rosemary.fasullo@louisville.edu

Justin Hill (Astrophysics – Holwerda)
Justin.hill.3@louisville.edu

Jannatul Tasnim (Theoretical Condensed Matter – Yu)
Kazijannatul.tasnim@louisville.edu

A.V.D.C. Vithanage (Experimental Condensed Matter – Sumanasekera)
ahangamavithanagedinushika.vithanage@louisville.edu

Anil Sharma (Photonics – Mendes)
anil.sharma@louisville.edu

Safia Alharbi (Theoretical Condensed Matter – Yu)
safiaabdullah.alharbi@louisville.edu

Ali Alzahrani (Experimental Condensed Matter – Sumanasekera)
Aialza01@louisville.edu

Milinda Bharatha (Experimental Condensed Matter – Sumanasekera)
milindab.kalutarakoralalage@louisville.edu

Diptaparna Biswas (Experimental Particle Physics – Banerjee)
D0bisw01@louisville.edu

Sahar Goharshanasen (Experimental Condensed Matter - Smadici)
S0goha01@louisville.edu

Jeremy Hornbeck (Astrophysics – Williger)
jbhorn02@louisville.edu

Chad Howard (Astrophysics – Kielkopf)
chad.howard@kctcs.edu

Mohammed Irziqat (Photonics – Mendes)

Mohammed.irziqat@louisville.edu

Mike Martin (Brown)
Mdmart02@louisville.edu

MD Rajib Khan Musa (Theoretical Condensed Matter – Yu)
M0musa02@louisville.edu

Camella-Rosa Nasr (Atmospheric Physics – Dowling)
camellarosa.nasr@louisville.edu

Matt Nichols (Astrophysics - Haberzetzl)
Mtnich05@louisville.edu

S.M. Shah Riyadh (Chemical Physics – Jinjun Liu)
smsah.riyadh@louisville.edu

George Schuhmann (Astrophysics - Lauroesch)
gsschu02@louisville.edu

Garrison Turner (Astrophysics – Kielkopf)
G0turn03@louisville.edu

VI. MISCELLANEOUS

A. Society of Physics Students and $\Sigma\Pi\Sigma$

1. Society of Physics Students

The Society of Physics Students (SPS) is a national association aligned with the APS (American Physical Society). Its purpose is to foster interest in physics among all students. As such, it is open to any student with an interest in physics. The SPS chapter at UofL is very active, having received outstanding chapter status more than ten years in a row. All physics graduate students are encouraged to become members. SPS meetings are held throughout the fall and spring semesters in addition to other group events, such as trips to national laboratories and departmental picnics. A small annual fee is charged by the national office, in return for which members receive a subscription to *Physics Today* and other benefits.

2. Sigma Pi Sigma $\Sigma\Pi\Sigma$

Sigma Pi Sigma is the national physics honor society. Generally, all Sigma Pi Sigma members are SPS members, but the reverse is not necessarily true. Membership of Sigma Pi Sigma is restricted to physics graduate and undergraduate students in the top one-third of their class. Honor society membership provides an outward sign of achievement in the field and as such is an important asset when applying for employment and/or graduate school. There is a one-time membership cost, discounted if already a member of SPS. All graduate students are encouraged to become members. Sigma Pi Sigma does not meet independently of SPS at the University of Louisville. Further information may be obtained from the SPS president and/or faculty advisor.

B. Departmental Resources

1. Physics Office

The Physics Office, located in NS 102, will be able to assist with most of your needs. Many of the available services are discussed below.

You are also welcome to use the refrigerator and microwave located in room 101. However, any perishable food left in the refrigerator more than ten days will be thrown away. Again, please help keep this area clean. In other words, if you make a mess, clean it up!

Fax: The departmental fax number is (502) 852-0742. Use of this machine is restricted to employment related matters.

Mail and Mailboxes: Mailboxes are located in Room 101. You will be assigned a box upon your arrival. Your mail as well as departmental notices will be placed in that box on a daily basis. You may also take advantage of the University's Postal Service to send both internal (within U of L) and external mail. Just place any mail you have in the proper tray. However, all external mail must be stamped or it will be returned. Also, if you are mailing something with a short deadline, it may be wiser to place it in a U.S. mailbox to insure its timely arrival. Please do not have personal mail sent to the Physics Department as this is considered a misuse of state funds.

Many GTAs have students drop off labs and homework in their mailboxes. If you decide to do this, inform the students that they will have access to this room during office hours (9:00 - 4:30) only. At other times, they may leave papers (no books) in the mailbox outside this room at their own risk. The name of the recipient should be listed on any document placed in the box. Please remind your students to do this. The department cannot be held responsible for lost documents or documents with no names on them.

Paychecks: All University employees must have their paychecks directly deposited into either a checking or savings account. We are aware that some of you may not have such an account yet and we will work with you to get everything set up properly. GTAs are paid on a monthly basis. You can expect your monthly pay to be deposited into your account by the 30th of each month unless that day falls on a weekend. In that case, it will be deposited on the previous Friday. A few times a year, such as during University Holidays, you will be paid at an earlier date. You will receive your final paycheck at the end of the month of July unless you leave your position before the scheduled date.

Photocopying: All GTAs are welcome to use the small copier located in Room 102A. However, copying is restricted to **teaching related duties only**. The copier is for the use of Physics personnel **only**. Never offer its use to other students. You may also ask the office staff to copy items for you. These will be completed as possible.

Supplies: Paper, pens, pencils, etc. are available for **teaching related duties only**.

GTA Office: The GTA office is located in NS 125. All GTAs will be assigned a desk in this room to use for studying, grading papers, etc.

Textbooks: Books/lab manuals are provided for your assigned classes. The texts are checked out of the office and must be returned before receiving your final paycheck.

2. Computing

The University wireless network is available free of charge in most areas of campus. For more information on information technology at UofL go to the IT web site (<http://louisville.edu/it/>). The Physics and Astronomy Department home page is <http://www.physics.louisville.edu/>

3. Machine Shop

The department supports a fully functioning machine shop (NS LL2). The machinist is Mr. Joshua Rimmer. It is unlikely you will need to use the machine shop prior to choosing a thesis topic/advisor.

IMPORTANT: Departmental resources are available for departmental related activities **only**. Personal use is **strictly prohibited**.

C. University Resources

A detailed description of all University facilities may be found in the Graduate School Catalog. What follows is a brief description of those resources of particular interest to Physics graduate students.

1. Computing

The Miller Information Technology Center is the headquarters of UofL's computing resources. Available facilities for research related applications include a general-purpose high-performance distributed-memory cluster (with four GPGPU nodes), a high-memory SMP system, and an informatics data management cluster. You are encouraged to investigate this facility.

2. Libraries

The William F. Ekstrom Library is located north of the Natural Science Building in the center of campus. Your University ID is required to borrow books from any university library. There is also an interlibrary loan system which provides access to texts/journals not housed in University libraries. Photocopying is available for a nominal fee in both libraries.

3. Bookstore

The campus bookstore is located inside the Student Activities Center. Required textbooks may be purchased here. Gray's Bookstore (1915 S. Fourth Street) and the College Book Warehouse (1819 S. Brook Street) are other sources of these materials.

4. Student Activities Center (The SAC)

The SAC contains restaurants, a cinema, athletic facilities (e.g. weightlifting, racquetball, basketball, etc.), as well as many other things worth checking out.

5. International Center

Located in Brodschi Hall, the International Center should be one of the first places visited by foreign students. Their staff will be able to address many of the questions and concerns the departmental staff is unable to answer.

APPENDIX

Forms: (Please copy these forms or download from the web as necessary)

1. Proposed course schedule
<http://www.physics.louisville.edu/cldavis/handbook/proposedcourses.pdf>
2. Exploration of Graduate Student Research Opportunities
<http://www.physics.louisville.edu/cldavis/handbook/ExpStuResOpp.pdf>
3. Request to Schedule Final Oral Defense
http://www.physics.louisville.edu/cldavis/handbook/RequestToScheduleOralExam_Form.pdf
4. Notification of selection of thesis/non-thesis option and thesis advisor
<http://www.physics.louisville.edu/cldavis/handbook/advfrm.pdf>

Excerpts from the Graduate School Catalog

Excerpts from the A&S Graduate Student Handbook

Campus Map

Exploration of Graduate Student Research Opportunities

Upon entering the Department of Physics & Astronomy no graduate student should have made an official commitment to any research group. During their first semester students are expected to explore the various research opportunities available in the department. Only when a student is aware of the options available can he/she make an informed decision regarding their future PhD research. The purpose of this form is to ensure that this exploration takes place.

Instructions to the student: You must speak to **at least three** research active faculty about their current research activities. This should include possible PhD research topics and the likelihood of funding to support such activities. Ask the faculty member to sign this form. The completed form should be submitted to the department's Graduate Program Director.

Student Name: _____

Student ID: _____

Faculty members contacted regarding potential research opportunities

	<u>Printed Name</u>	<u>Signature</u>	<u>Date</u>
1.	_____	_____	_____
2.	_____	_____	_____
3.	_____	_____	_____

Student Signature: _____

Date: _____

Graduate Program Director: _____

Date: _____

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Request to Schedule Final Oral Defense

Completion of this form, and submission to the Graduate Program Director (GPD), is required before a final oral defense will officially be scheduled.

Instructions to the student: A substantially complete copy of your dissertation should be provided to each member of your committee and the Department Chair no later than two weeks before the date of your proposed oral defense. Obtain the signatures of your committee members and the chair when you give them your dissertation. Complete the details regarding your examination and submit the completed form to the GPD. **Note that this form must be received by the GPD no later than two weeks before the proposed date of your oral defense.**

Instructions to Committee Members & Chair: By signing this form you are attesting that you have received a substantially complete copy of the student's dissertation.

Student Name: _____ **ID #:** _____

Signature: _____

Thesis Title: _____

Date of Defense: _____ **Time:** _____

Location of Defense: _____

	Name	Signature	Date
Principal Advisor	_____	_____	_____
Committee Member	_____	_____	_____
Committee Member	_____	_____	_____
Committee Member	_____	_____	_____
Committee Member	_____	_____	_____
Department Chair	_____	_____	_____
Graduate Program Director	_____	_____	_____

UofL Physics & Astronomy
 January 2019

Excerpts from the Graduate School Catalog

For the New Graduate Student

Overview

The University of Louisville operates on a semester system that includes a Fall Semester, Spring Semester, and Summer semester with multiple terms. The University has a computerized admissions and registration system. Students are advised to include their full name and date of birth on all correspondence with the University to facilitate the identification of admission credentials and requests for information. Students who do not enroll for the semester for which they apply may be required to reapply and resubmit credentials. The University holds credentials on applicants for a limited time.

Student Responsibility

It is the responsibility of the graduate student to become familiar with and observe all policies and requirements of the Graduate School and of his or her particular degree program and department. Policies, procedures, and requirements are subject to change, and it is the responsibility of the graduate student to keep her/himself apprised of current regulations. All students must respond to official notices issued by administrative offices and instructors, whether these notices be posted on official bulletin boards, are sent through postal, or e-mail. A student's status is not dependent upon a written notification but is a consequence of circumstances in the admission process and the student's academic performance. Written notification is simply a verification of status.

Graduate Credit

Courses listed in this catalog are offered for graduate credit. To receive graduate credit, a student must register for the course through the Graduate School or through another graduate-level program, such as a masters or docors program. Students who take these courses as post-baccalaureate registrants do not receive graduate credit.

Prerequisites

Prerequisites for all courses include graduate status and the consent of the graduate advisor (for registration). Specific course prerequisites are indicated in the course listing in the curriculum listing of this catalogue.

Academic Policies, Procedures and Requirements

The general policies, procedures and requirements for advanced degrees are stated below; however, each advanced degree has requirements, specific to that degree. These specific requirements are detailed in the program descriptions that follow this section. These requirements must be consulted, so that the graduate student may be fully apprised of the conditions he/she must meet in order to receive an advanced degree.

The policies and regulations described in this catalog cannot be superseded or invalidated by either oral or written agreement with faculty, staff, or administrators unless a variance is confirmed in writing by the Vice Provost for Academic Affairs, in consultation with the Graduate Council.

Registration

The University of Louisville uses an on-line web registration system. The schedule of courses for each term may be reviewed at <http://htmlaccess.louisville.edu/classSchedule/setupSearchClassSchedule.cfm>. Students must first contact their graduate advisor or graduate program director to discuss course selections. Students in good standing and admitted without conditions may proceed with the registration process. If, however, a student has been admitted with conditions, or is in probationary status, the student must contact the graduate program director regarding the implications of the admission status.

Full-Time Study

Full-time study is defined as enrollment in:

1. Nine (9) credit hours during the Fall semester, OR
2. Nine (9) credit hours during the Spring semester, OR
3. Six (6) credit hours during the Summer semester, OR
4. In degree candidacy status.

Full-Time Study for University Fellows and Graduate Assistants

All University Fellows and Graduate Assistants must be enrolled as full time students during the period for which they are receiving financial support.

Duration of Support

Graduate assistantships are awarded on an individual basis according to the needs of the department, professor or project. The number of years or semesters for which these appointments are renewable depends on the department. The university wide official maximums for this type of university sponsored financial support are typically six years for doctoral students, three for master's students and four for master of fine arts students.

Workload Limitations for Graduate Assistants

Graduate assistants who are receiving a stipend, whether in the form of a University Fellowship, Externally Funded Fellowship, Graduate Research, Teaching or other Assistantship are limited to working 20 hours per week work on the projects designated by the stipend award. However, students may be eligible to work an additional 9 hours per week, with the possibility to earn income for the work, if certain conditions apply. The maximum additional time commitment is 9 hours per week, in addition to the work performed for the GA stipend. However, international students who have a F1 VISA are not eligible for this waiver, and are limited to working no more than 20 hours per week.

The Dean of the School of Interdisciplinary and Graduate Studies must approve requests for students to perform additional work. The Chair of the student's department or the Graduate Program director must complete the 20 hour waiver form, which can be found at: <http://louisville.edu/graduate/forms/ga-waiver-request/>. This form will be forwarded automatically to the School of Interdisciplinary and Graduate Studies. If the request is approved, the Office of Payroll and the person who initiated the request will be notified.

Continuous Enrollment

Continuous enrollment is defined as being registered in both Fall and Spring if registering for course work. If a student has been admitted to either masters or doctoral degree candidacy, continuous enrollment in candidacy status is required for the Fall, Spring and Summer terms (only one term of registration is required in summer terms). Students must be enrolled during the semester in which they wish to graduate.

Course Loads

Normally, the maximum number of hours that may be taken in a regular semester is 12. The maximum number of hours that may be taken in the Summer session (both terms) is 12, including research hours.

Overloads

A student who wishes to enroll in more than the maximum number of hours must petition the unit dean to obtain permission.

Auditing Courses

Auditing at the graduate-level is available only to students who are enrolled in a graduate program. A student who wishes to audit a course must obtain permission from the course instructor and the director of the program in which the student is enrolled using the proper form provided by the Office of the Registrar. Auditing a course will not satisfy a prerequisite for a graduate course or a degree requirement.

Transfer of Credit

Earned graduate credit may be transferred from regionally accredited institutions that offer advanced degrees. The number of semester hours transferable, upon request, is six (6). Up to six (6) additional transfer hours may be petitioned, provided that these additional hours are not credits earned by extension, thesis or practicum and provided also that the residency requirement of 24 semester hours is maintained by the addition of University of Louisville credits to the total program.

Course work taken more than three years prior to the student's application to a graduate program will not normally be considered for transfer; however, such requests will be reviewed by the Vice Provost for Academic Affairs upon recommendation by the department chair and the unit dean.

The course work being considered for transfer must have been taken while the student was enrolled in an accredited graduate or professional school and must be evaluated for transfer by the director of the graduate program in which the student is seeking additional graduate work. Six (6) credit hours may be transferred from a previously earned master's degree toward a doctoral degree or a second master's degree, subject to the approval of the degree program and the unit dean. Hours earned toward a culminating experience such as a thesis, practicum, or internship shall not be transferable to the second master's degree. Only courses in which the student earned grades of "B" or better will be considered for transfer. Hours and quality points earned at other institutions are not included in the calculation of a student's grade point average.

Courses in which grades of "P" were earned must have the approval of the unit dean in order to be transferred.

Transfers of credit from constituent schools and colleges of the University of Louisville are not subject to the above limitations on transfers but require the recommendation of the department chair and the approval of the unit dean. Upon approval of the graduate program, students may apply the coursework from no more than one certificate program towards a graduate degree program.

Satisfactory Progress

All graduate students are expected to make steady and satisfactory progress toward the completion of degrees. Students who are not enrolled for a period of more than 12 months will be considered to have withdrawn from the program. Students who seek to return after such a period of time must contact the graduate program director. Based on the request of the graduate program, the unit dean will consider the student for readmission.

Satisfactory progress also requires maintaining the standards of academic and professional integrity expected in a particular discipline or program and, in some disciplines, may include demonstration of the ability to function as a professional practitioner. Failure to maintain these standards or demonstrate such abilities may result in the student's termination from the program.

Degree Candidacy

Students enter Degree Candidacy upon completion of all course work, qualifying exams, required research credit hours and other co-curricular requirements. Students who are enrolled in degree candidacy are considered full-time students. While in Degree Candidacy, it is the responsibility of both student and mentor to maintain contact to ensure continuous progress towards the completion of the degree. In some cases, a master's student may complete the requirements of a degree program without the need to enter Degree Candidacy.

Although students must complete all required courses before entering Degree Candidacy, they have the option of taking additional specialized courses, e.g., courses offered by visiting or new faculty, while in Degree Candidacy (in those cases payment of both the candidacy fee and the course tuition will be required).

When all other degree requirements are met, students may enroll in Degree Candidacy in order to meet the requirement that all students must be enrolled during the semester in which they wish to graduate.

Degree Programs must inform the Vice Provost of Academic Affairs when students have met all requirements and are ready to enter Degree Candidacy. Once a student is admitted to candidacy, enrollment in Degree Candidacy status must be continuously maintained year round (i.e. Fall, Spring, and Summer) until the degree is awarded. The only exception to this policy of continuous enrollment is if the unit dean and the Vice Provost of Academic Affairs have granted the student a formal leave of absence.

Once a student initially enrolls in Degree Candidacy, the Registrar will automatically enroll the student in Degree Candidacy until the student applies to graduate. 1.) Failure to pay the candidacy fee will cancel a student's enrollment. 2.) If a student has any type of hold on the account, the student will no longer be enrolled automatically in Degree Candidacy. To reestablish enrollment in Degree Candidacy, students will be required to pay the candidacy fee for each semester during which candidacy was voided and/or not maintained. To restore Degree Candidacy, the student must contact the Director of Graduate Studies in their degree program.

Time Limitations for Degree-Seekers

Master's students must complete the degree requirements within six (6) years of beginning the program of study. Doctoral students have four (4) years after passing the qualifying exams to finish all other degree requirements. While granting an extension of time is rare, requests for extension of time must be submitted in writing to the graduate program director of the student's department. Once reviewed by the department, the request is forwarded to the unit dean, and then to the Vice Provost for Academic Affairs with supporting documentation for review. Students must be considered in good standing for the request to be considered.

Academic Standing

Good Standing

A graduate student is in good standing when his/ her graduate grade point average is 3.0 on a 4-point scale or higher. A student must be in good standing in order to receive a degree.

Academic Probation

Any student with a semester grade point average (GPA) below 3.0 will receive an academic warning from the School of Interdisciplinary and Graduate Studies. A notification will be sent to the student as well the student's graduate program. Should a student's cumulative GPA fall below 3.0, the student will be placed on probation until the student regains a 3.0 average (which is required to graduate). Ordinarily students are not permitted to continue on academic probation for more than one semester, but upon request of the student's graduate program, the unit dean may submit a variance request to the Vice Provost for Academic Affairs to approve continuation of academic probation beyond a single semester. Students on academic probation for more than one semester risk dismissal from the graduate program. Graduate programs have the prerogative to establish more stringent criteria for which students may be placed on academic probation.

Academic Dishonesty

Plagiarism, cheating and other forms of academic dishonesty are serious violations of academic conduct and may result in permanent dismissal. Students are expected to be familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities <http://louisville.edu/dos/students/studentrightsandresponsibilities>. A plea of ignorance is not a defense against the charge of academic dishonesty.

Student Leave of Absence

A student who has been accepted into a graduate program is expected to remain in continuous enrollment, either full-time or part-time, throughout his/her matriculation. Students who fail to enroll for a period of more than 12 months will be considered to have withdrawn

from the program. Once a student enters candidacy, he/she must maintain continuous candidacy (fall, spring, summer) and pay the appropriate candidacy fee.

However, if circumstances arise that may cause an interruption in graduate study, a student may apply for a leave of absence by requesting such a leave from the unit dean. A requested leave cannot exceed one year; however, under extreme circumstances, a second, subsequent request may be granted by the Vice Provost for Graduate Affairs. Students must be considered in good standing for the request to be considered.

A student may not be enrolled in the university during a leave of absence. A student on a leave of absence is not required to pay tuition, fees, or candidacy fees, but is not entitled to any services from the university during the leave, including mentorship from faculty.

If a leave of absence is granted to a doctoral student in candidacy, the time limitation of completing all other requirements within four years after passing the qualifying examination shall be extended by the same time as the length of the leave. However, an appeal for an extension of this time limit, specifying the exact circumstances, can be included in the request for a leave or submitted in a subsequent letter at the time of re-enrolling to the Vice Provost for Graduate Affairs addressing this particular matter.

No degree will be granted to a student on an official leave of absence. The student must re-enroll in the next term following the conclusion of the leave and be enrolled in the term in which a degree is granted. A leave of absence does not relieve a student from adherence to policies regarding residency and candidacy (except that the time limit for candidacy may be extended, as indicated in the previous paragraph).

Requirements for PhD Degrees

In addition to the particular rules of the various graduate programs as stated in their sections of this catalog, the following general rules apply to all Doctor of Philosophy programs.

The award of a Doctor of Philosophy degree indicates that a student has attained mastery of a field and has demonstrated the capacity to perform independent scholarly research. Accordingly, no specific minimum number of credit hours has been established for Ph.D. programs. However, ordinarily the equivalent of three years of full-time graduate study is a minimum.

The doctoral degree is not awarded solely upon completion of a curriculum of courses, even though the student has done superior work in them; rather, it is awarded in recognition of creative scholarship as demonstrated by a substantial contribution in the candidate's chosen field. Only students who offer promise of meeting this high standard will be accepted by a graduate program to begin work toward this degree. Doctoral degree programs typically have more restrictive criteria for admission than those for admission to a master's degree program. The prospective student should consult in person with the graduate program in which he/she wishes to major.

Program of Study

Each applicant for the doctorate is expected to take such courses as may be required for both a strong foundation in the field and the development of a specialization. The student's program will consist of a major field and such minor fields as the major professor, the student, the program faculty, and department chair may agree upon. This program may be modified at any time upon the recommendation of the major professor and approval of the department chair and the dean of the unit.

All courses offered by the University, at any level and in any school, shall be accessible to the doctoral student, subject to approval by the instructors.

Residency for Doctoral Students

To ensure that doctoral students have the opportunity to participate fully in the intellectual life and research atmosphere of the University, at least two years of study must be spent at the University of Louisville and at least one must be spent in full-time residency (except as indicated below). The two-year requirement allows students to build mentoring relationships with faculty members and accrue classroom and research experience over time, while the full-time residency requirement is designed to provide students with at least one year of immersive, intensive study.

According to the Council of Graduate Schools, residency advantages students in the following ways: ". . . fluency in the language and vocabulary of the [field of] specialization is enhanced by frequent and close association with other students in the same field; competence in the field is enhanced by close familiarity with the university's libraries; valuable experience is gained by attending and participating in both formal and informal seminars, colloquia, discussions led by specialists visiting from other campuses, laboratories, or governmental research groups; and thesis or dissertation research is facilitated by frequent consultation with the advisor."

Full-time residency requires that a student be registered for a minimum of 18 credit hours within a twelve-month period. Registration for candidacy cannot be used to meet this requirement.

Alternative Residency Track

All doctoral students must meet the two-year enrollment requirement. Students enrolled in part-time doctoral work may substitute four terms of continuous enrollment (summer terms can be used to meet this requirement) for the full-time residency requirement.

Programs that allow part-time and/or off-site participation must provide a rationale to the Vice Provost for Academic Affairs, indicating how they ensure that such students have access to an intensive and immersive educational experience. The rationale must be approved by the Vice Provost for Academic Affairs and be on file in the School of Interdisciplinary and Graduate Studies.

All doctoral students must meet the two-year enrollment requirement. Students enrolled in part-time doctoral work may substitute four terms of continuous enrollment (summer terms can be used to meet this requirement) for the full-time residency requirement.

Programs that allow part-time and/or off-site participation must provide a rationale to the Dean of the School of Interdisciplinary and Graduate Studies, indicating how they ensure that such students have access to an intensive and immersive educational experience.

Foreign Language Requirement

Foreign language proficiency is no longer a general requirement of the Graduate School. However, certain departments may have established such requirements, which will be specified in their sections of this Catalog.

Qualifying Examination and Candidacy

The applicant for a Doctor of Philosophy or Doctor of Education degree must pass a qualifying examination, oral or written, or both. Its purpose is to verify that the student has sufficient understanding of and competence in his/her field to become a candidate for the degree. This examination may be referred to by some programs as the preliminary, comprehensive, or candidacy examination. To be eligible for this examination, the student must have satisfactorily completed the major portion of the prescribed course work and must have met the foreign language requirement of the program. It is the student's responsibility to be aware of the program's policy on the consequences in the case of failure of all or part of the examination. A student who fails the examination may not be allowed to retake it more than once.

A doctoral degree student must have been admitted to candidacy not later than the end of the ninth month prior to the awarding of the degree, that is:

- August graduation - November 30 of preceding year
- December graduation - March 31 of same year
- May graduation - August 31 of preceding year

Although the prescribed course work may have been completed, the candidate must maintain an active registration status until the degree is awarded (see previous section on General Academics Policies and Requirements, subsection Maintaining Candidacy).

Time Limitation

The candidate must complete all other requirements for the degree of Doctor of Philosophy within four calendar years after passing the qualifying examination. In exceptional cases, the Vice Provost for Graduate Affairs is empowered to grant limited extensions of this four-year period.

Dissertation

A dissertation is required of all candidates for the degree of Doctor of Philosophy. It is to be a scholarly achievement in research, and should demonstrate a thorough understanding of research techniques in the field of inquiry and the ability to conduct independent research.

The dissertation shall be read by a reading committee, chaired by the major professor, and appointed by the unit dean upon the recommendation of the chair of the major department. This committee shall consist of not fewer than four members, and must include one representative from outside the program. All members must be qualified to serve on the committee as specified by their Unit's Guidelines for Graduate Faculty. The dissertation must be approved by the committee and the chair of the major professor's department. If a student is enrolled in a doctoral program in Interdisciplinary Studies, the dissertation shall be approved by the chair of the major professor's department, and reading committees shall be appointed by the Dean of the School of Interdisciplinary and Graduate Studies upon recommendation of the major professor.

The dissertation is to be submitted in completed form to the chair of the major department, or to the chair of the major professor's department in the case of a student enrolled in a doctoral program in Interdisciplinary Studies, at least thirty days before the end of the term in which the candidate expects to be graduated, and the candidate is not eligible for final examination until the dissertation has been approved.

One unbound copy of the dissertation, signed by dissertation committee, must be deposited with the School of Interdisciplinary and Graduate Studies before graduation. Graduate students completing a dissertation in a Ph.D. program offered through the J. B. Speed School of Engineering are required to submit additional copies. Students should contact the dean of that school for specific information. Standards for the Preparation of Thesis and Dissertations are available on the website of the School of Interdisciplinary and Graduate Studies. Alternate standards must be approved by the Vice Provost for Graduate Affairs if in conflict with this standard.

Final Oral Examination

The final oral examination is to be a defense of the dissertation and a demonstration of the candidate's mastery of his/her field. The examination will be given by a committee of Graduate Faculty members appointed by the unit dean upon recommendation of the chair of the major department. The Committee will consist of four or more members representing the major department and at least one allied program. The major professor and the remaining Committee members must be qualified to serve on those capacities as specified by the unit's guidelines for graduate faculty. The examination committee for doctoral students in Interdisciplinary Studies will be approved by the Dean of the School of Interdisciplinary and Graduate Studies upon recommendation of the major professor.

The Dean of the School of Interdisciplinary and Graduate Studies shall notify all members of the Graduate Faculty at least one week in advance that they are invited to participate in the examination, but only members of the committee may vote. At the discretion of the major department, a portion of the examination may be written.

The examination must be taken at least fourteen days before the end of the semester in which the degree is to be granted. To be passed in this examination, the student may not receive more than one abstention or dissenting vote.

Requirements for the Master's Degree

The departmental announcements in this catalog should be consulted in all instances; however, the following rules apply to all master's degree programs.

Course Credit

A minimum total of 30 semester hours of graduate credit is required for the master's degree. At least 15 semester hours must be in courses of the major subject area, and the remaining hours in the program distributed as recommended and approved by the major department. At least one-half of the credits counted toward the degree (exclusive of thesis, practicum and internships) must be in courses open to graduate students only (600 level or above). A grade average of 3.0 or better must be maintained.

Residency for Masters Students

Masters students must take at least 24 hours of course work at the University of Louisville to satisfy the residency requirement for the masters degree.

Time Limitation

There is a time limit imposed, stipulating that credit earned more than six years prior to the completion of the degree may not be counted toward meeting its requirements. This time period may be extended upon recommendation of the student's department chair and the approval of the Vice Provost for Graduate Affairs.

Maintaining Candidacy

Refer to previous section entitled, General Academic Policies and Requirements, see subsection entitled Maintaining Candidacy.

Thesis

Students completing degree programs that include a thesis must submit the thesis to their major professor at least thirty days in advance of graduation (guidelines may be found on the web site of the School of Interdisciplinary and Graduate Studies).

Acceptance of the thesis shall be at the discretion of a special reading committee composed of the major professor and two other committee members. One member shall be from outside the program, and all three members must be qualified to serve on those capacities as specified by their Unit's Guidelines for Graduate Faculty. The committee shall be approved by the unit dean upon recommendation of the chair of the major department. The committee shall complete its review of the thesis at least one week prior to the final oral examination.

One unbound copy of the accepted thesis, signed by the committee members, must be deposited with the School of Interdisciplinary and Graduate Studies (see Schedule of Courses for due date). Graduate students completing a thesis in an M.S. program offered through the J. B. Speed School of Engineering are required to submit additional copies. Students should contact the office of the dean of that school for specific information.

The thesis normally carries 6 semester hours of graduate credit, which is in addition to the 15 hour minimum taken within the major department. In certain departments, a professional paper may be required in lieu of a thesis. For procedures in these instances, consult the chair of the department.

Final Oral Examination

The final oral examination shall be conducted by a committee of Graduate Faculty members recommended by the chair of the major department and appointed by the unit dean.

The examination must cover the materials presented in the thesis or professional paper and may include the content of courses taken or other matters pertinent to the candidate's admissibility to the master's degree. At the discretion of the graduate program, a portion of this examination may be written. The recommendation for the degree shall be determined by a simple majority of the committee members. Recommendation shall be made to the graduate dean at least one week prior to graduation.

In the event of an unfavorable vote, the committee may refuse the candidate's admissibility to the master's degree, or it may recommend another examination with or without additional work.

For master's students enrolled in Interdisciplinary Studies, a member of the graduate faculty must agree to serve as the major professor to guide students in curriculum selection and thesis work. The chair of the major professor's department will recommend to the Dean of the School of Interdisciplinary and Graduate Studies appointment of reading and examination committees.

Application for Degree

Degrees are awarded in August, December, and May. Candidates who expect to receive degrees on a particular award date must complete the application for degree on ULink before the deadline specified in the University calendar (see Schedule of Courses).

The University holds two commencement ceremonies each year. For specific information regarding the ceremonies, apparel, dates, etc. please visit the Commencement web-site: <http://www.louisville.edu/commencement/>

Each student who is required to submit a dissertation or thesis to fulfill degree requirements must follow the guidelines for The Preparation of a Dissertation and The Preparation of a Thesis, which are located on the website of the School of Interdisciplinary and Graduate Studies. Prior to submission of the final copy of a dissertation/thesis, students must contact the School of Interdisciplinary and Graduate Studies to schedule a review of the document.

Policies Governing Graduate Courses

Graduate Students Taking 500-Level Courses

Courses with numbers from 500 to 599 may be open to both advanced undergraduate and graduate students and can be taken by graduate students for graduate credit. Those numbered 600 and above are primarily for graduate students.

Graduate students who wish to receive graduate credit for 500-level courses must complete additional requirements (such as additional written work or oral presentations) that are more stringent than those required of undergraduates. These additional requirements for graduate credit must be specified in the course syllabi. The student's completion of graduate requirements must be verified in writing by the instructor if graduate credit is requested after the course is completed.

Not all 500-level courses are available for graduate credit. The student is advised to consult his/her department for information on any particular 500-level course.

Undergraduates Taking Graduate Courses

An undergraduate student with special permission of the unit dean and the instructor in the course may register in a 500 level courses at the graduate level, or in 600 level graduate courses. Such courses will satisfy requirements toward the undergraduate degree and therefore cannot be used for subsequent graduate credit. The student must be registered for at least one undergraduate course if requesting to enroll in a graduate course.

In rare cases, undergraduate students at the University of Louisville who are within six (6) semester hours of completing the baccalaureate requirements and who are enrolled in a graduate course may obtain graduate credit. This can only occur if the course has not been used to satisfy part of the baccalaureate requirements and who are enrolled in a graduate course may obtain graduate credit. This can only occur if the course has not been used to satisfy part of the baccalaureate requirements, and if the recommendation of the chairman of the department involved and the approval of the unit dean are obtained.

Grades and Grading Policies

University Grade Point Average (GPA)

The GPA appearing on the University transcript at the end of each semester of enrollment will be the official GPA for determining academic standing. The GPA will be based upon all courses taken while the student is enrolled as a graduate student, including undergraduate courses. Courses taken at the 500-level and above will be counted as graduate courses. While possibly including undergraduate coursework, this transcript will determine the overall Graduate GPA. The program faculty and unit dean will monitor this Graduate GPA to ensure students maintain at least a 3.0 to remain in good standing.

Grading System

The Graduate School utilizes a plus/minus grading system. It is at the discretion of the instructor to determine the use of plus/minus grading.

The following is the grading scale:

Grade	Quality Points		Grade	Quality Points
A+	4.0		C	2.0
A	4.0		C-	1.7
A-	3.7		D+	1.3
B+	3.3		D	1.0
B	3.0		D-	0.7
B-	2.7		F	0.0
C+	2.3			

C Grades

The student's academic program may approve six hours of coursework in which a grade of "C+, C, or C-" was received to count toward the completion of degree requirements.

Approval of the Graduate School Dean must be secured in order to count additional hours with any grade of C in any course that is part of the degree program. In no case may more than nine hours of "C" be used to fulfill graduate degree requirements. Units or programs may choose not to permit any courses in which a grade of C+, C, or C- has been earned to be used in fulfillment of degree requirements. Although grades below C- will be calculated in the graduate student's grade point average, courses in which these grades have been earned will not be counted towards the fulfillment of degree requirements.

Other Grades

"W" - means Withdrew and carries no quality points. No student may withdraw from any course after the published drop date. In exceptional cases, the unit dean may grant a student's request to withdraw from courses because of illness or conditions beyond the student's control. Poor performance is not a valid reason to grant an exception.

"I" - means Work in Course Incomplete. If the work is not completed by the end of the next term, regardless of whether the student is enrolled, the "I" automatically becomes an "F".

"X" - means course work has not been finished because of the nature of the research or study involved, e.g., thesis or dissertation work. This grade is reserved for courses that by their nature extend beyond one semester. This grade may not be used for coursework that is confined to a semester but not completed by the student. During the time an "X" grade is carried on the transcript, continuous enrollment is not required.

Graduate students enroll in courses on a term basis. Graduate courses may not be extended beyond the enrollment term, except as noted for open-ended courses eligible for the "X" or deferred grade. An "I" grade does not extend the course, but rather extends the time a student has for completion of work assigned in the course. The "I" must be removed within one semester and the new grade assigned for the term in which the student was originally enrolled or the "I" is changed to an "F".

Pass/Fail Grading Option

Each program has the discretion of extending a Pass/Fail option to any or all of its graduate students and graduate courses.

When using the Pass/Fail option for graduate students enrolled in graduate courses, A+ through C- will be passing grades and D+ through F will be failing grades.

Changes of Grades

No changes of grades can be made without a request and explanation on the part of the faculty member giving the grade and the approval of the unit dean.

Missing Grades

All missing grades will be changed to failing grades one year after the completion of the semester in which the course was taken.

Repetition of Courses

A student who has received the grade of "C" (in a course that is a degree requirement), "D" or "F" may repeat that course upon the approval of the graduate program advisor and the unit dean. When a student repeats a course, the grade point average will be calculated on the basis of the last grade earned, although all previous grades will remain on the transcript.

Excerpt from the A&S Graduate Student Handbook (2017-18)

Academic Policies

Graduate Catalog

The governing document for graduate students is the graduate catalog which contains all the rules and regulations that concern graduate students. The catalog is updated regularly with the most recent version available online at the School of Interdisciplinary and Graduate Studies' (Graduate School) website.

A&S Graduate Student Responsibilities

In regard to academic policies, graduate student responsibilities include the following:

- Become familiar with and observe all current policies and requirements of the Graduate School, A&S, and the student's degree program and department.
- Respond to official notices issued by administrative offices and instructors, which may be posted on official bulletin boards, sent via e-mail or snail mail.
- Make steady and satisfactory progress toward the completion of degrees.
 - Students who fail to enroll for a period of more than 12 months will be considered to have withdrawn from the program. Students who seek to return after such a period of time are required to apply to their departments for readmission. Based on the request of the department, the Dean of A&S will consider the student for readmission.
 - Prior to reapplying, students should speak with their department. Students may submit a reenrollment form to the Office of the Registrar if it has been less than two years since their last enrollment.

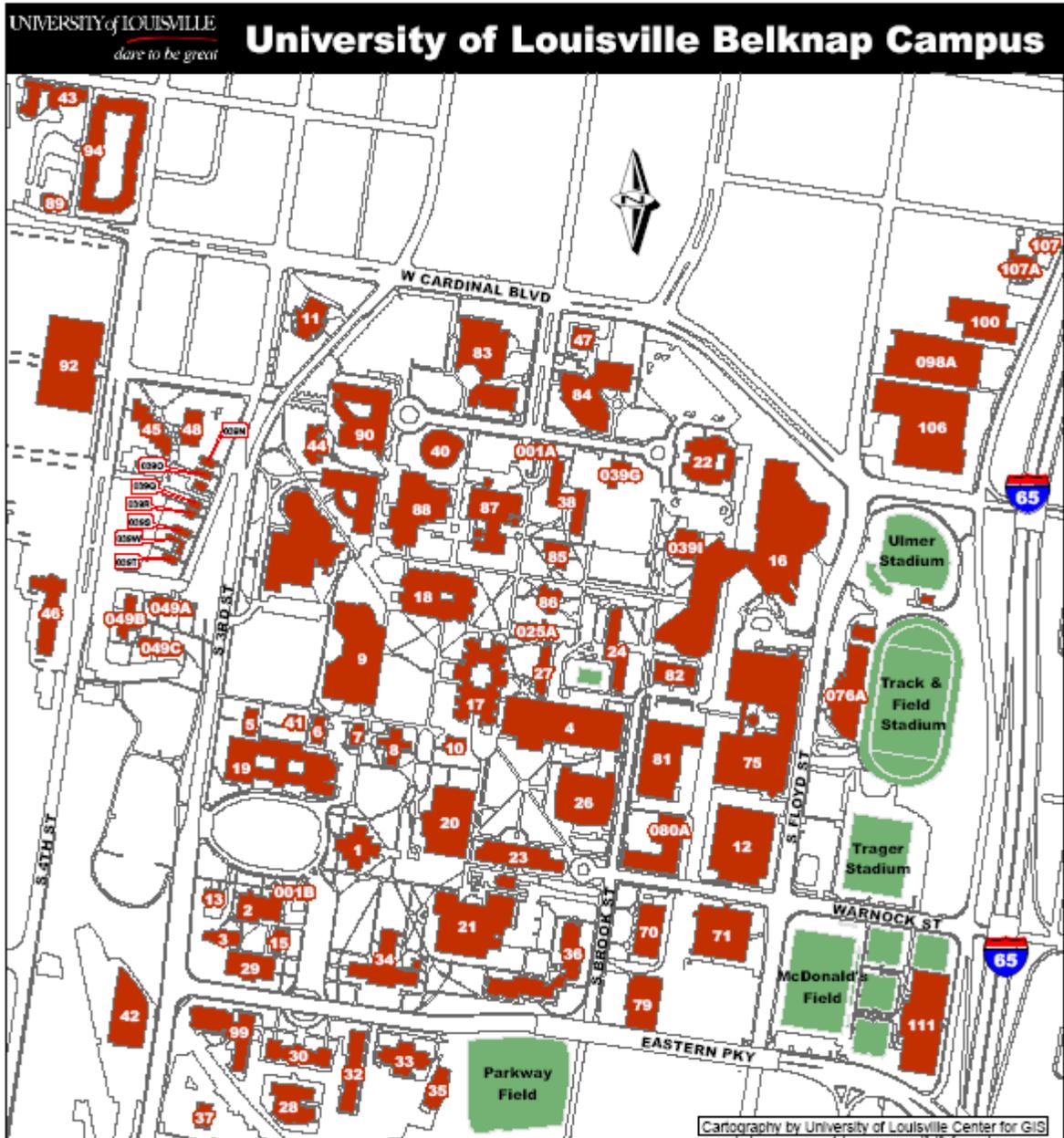
Parental, Family, & Medical Leave

Please review the policies below in the event of any parental, family, or medical situations which may require leave from full-time duties.

Policy 1: Petition for Part-time Enrollment Status – Graduate students must be enrolled full-time to receive stipend awards, but a graduate student who faces extenuating circumstances (a serious health condition, an issue with care of a family member, etc.) may petition to enroll in part-time status and continue to receive the full stipend award, for one semester only, for a situation that does not require a full leave of absence. The department or program may require the student to continue the service obligations that are linked to the stipend award while in part-time enrollment status. The student must be able to document the need for this request.

Policy 2: Parental Leave – Any student who receives a scholarship from the Graduate School is eligible for leave from their academic responsibilities for a period of 6 weeks in connection with the birth or adoption of a child. Either parent is eligible for parental leave. The student will be allowed to retain the stipend, tuition and other benefits during the leave period as well as remain in full-time enrollment status. It is the student's responsibility to work with their instructors, mentor, and Director of Graduate Studies to make arrangements to accommodate for missed lectures and service duties during the leave period.

Campus Map



Cartography by University of Louisville Center for GIS

1600 So. Fourth St. Dorm	90	Delta Zeta Sorority	39T	Hughes Carpet Shop	103	Miller Info Tec	21	Solvent Storage	35A
Arch Survey/Tractor	90	Dev. & Univ. Relation	79	Hughes Ground Shop	101	Minority Affairs	39G	Stadium Facilities	106
Archives/Graphic Pro	96	Doughterty Hall	29	Hughes Hydro-Tech	104	Music School	33	Steen & Chilled Water	70
Baptist Student Ctr	85	Equivalency Center	66	Hughes Office Bldg.	102	Natural Sciences Bld	34	Stevenson Hall	27
Base-Bald Tennis Ct	111	Eth Service Center	107A	Information Center North	1A	Opperheuser Hall	5	Stoddard Johnston	77
Belknap Parking Gara	75	Electron Library	9	Information Center South	1B	Papa John's Cardinal	108	Stokler Hall	88
Belknap Research Bldg	4	Engineering Graphics	37	Inst. Of Inter. Dev.	15	Parkey Fieldhouse	35	Studio Art/Printer	71
Belle Johnson Hall	94	Envt Hall	33	J.S. Speed Hall	30	Patterson Hall	3	Swin Student Activities	16
Billy Minard Hall	45	Ford Hall	7	Johnny Unice Tower	47	Paul S. Lutz Hall	25	Center	
Bingham Humanities	17	Fraternity A	49A	Johnson Building	77	Personel/Payroll	105	The Playhouse	11
Brigman Hall	2	Fraternity Bldg C	49C	Jovett Hall	6	Pi Beta Phi	39Q	Thinkwell Hall	24
Brodski Hall	41	Gardner Hall	8	Kappa Delta Sorority	39S	Ralph Wright Natatorium	12	Triangle Fraternity	39O
Cardinal Hall	46	Greiner Hall	40	Kansey Library	20	Red Barn	39I	University Club Bldg	22
Central Receiving	105A	Gotschalk Hall	10	Lambda Chi	39W	Reynolds Building	42	University Tower Apt	43
Chemistry Building	36	Greenway Hall	1	Life Sciences	10	Robbins Hall	44	Upper Univ. Plan & Con	89
Chi Omega Sorority	39E	Health And Counseln	82	Louisville Hall	107	Sabole Hall	31	Urban Research Inst	43
College Of Education	64	Honors Dorn (B)	49B	Louisville Hall	45	Schwicker Hall	30	Vogt Building	99
Crawford Gymnasium	26	Honors Prog. Bldg	35A	Mcandree Hall	13	School Of Business	90	W.S. Speed Hall	32
Davidson Hall	67	Houshens Building	01	Miller Hall	30	Sigma Phi Epsilon	39T	Wilson Wyatt Hall	19