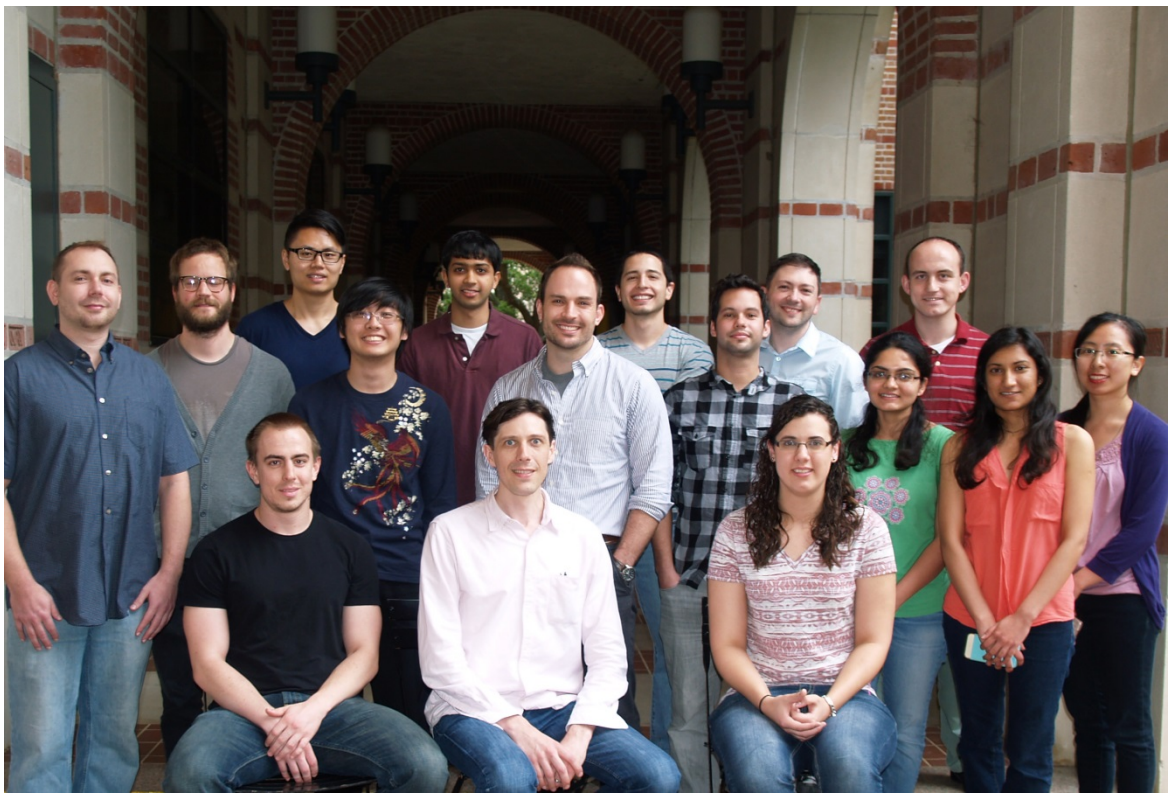
Applied Physics Graduate Program

2018-19 Graduate Student Handbook

Graduate Degree Requirements and Procedures



This handbook provides general guidelines for Applied Physics graduate students. In addition to being in agreement with the regulation stated in this program handbook, students must also be in agreement with the General Announcements (GA) and the Code of Conduct of Rice University. Students are responsible for meeting all program requirements and all the university requirements.

In case there is conflicting information, university-wide regulations take precedence over the institute and program regulations, which take precedence over research group-wide regulations.

In doubt, students should seek help first at the program level (graduate administrator, advisor, program chair) and then at the central administration level (Graduate and Postdoctoral Studies.)

Revisions or additions of this handbook may be made from time to time. A current version is available at https://sci.rice.edu/graduate_handbook. Students should keep a personal file containing this document, future memos about rule changes and other departmental matters, and documentation related to graduate progress.

Effective August 16, 2018

Contents

Introduction

Welcome to the Smalley-Curl Institute's Applied Physics Graduate Program! Your admission to Rice is the latest milestone in an exemplary academic career. At Rice, researchers and faculty members at the forefront of their fields will guide your progress to receiving a doctoral degree. You will be taught to think creatively, be a part of a network of knowledge, and redefine your own limits.

The PhD program prepares students for research careers in academia and industry. Students admitted to the PhD program with a bachelor's degree are required to complete at least 90 hours of credit (typically 27 hours of coursework and 63 hours of research).

Graduate education is a unique mixture of instruction, training, mentorship, and scientific collaboration. In our program, we want each student to get the most out of their experience, contributing to the advancement of science and engineering through outstanding original research, while at the same time preparing for a professional career. Our students have gone on to outstanding, diverse professional careers, including academic research, government research and service, technical careers with companies ranging from large corporations to exciting startups, in fields as diverse as the oil industry, consulting, education and more.

Institute and Program Members

Applied Physics Faculty & Staff

Interim Chair, Applied Physics (APP)	Naomi Halas
Applied Physics Administrator	Carol Lively

Applied Physics Curriculum and Admissions Committee (APCAC)

Palash Bharadwaj	Jason Hafner
Kaden Hazzard	Naomi Halas
Thomas Killian	
Christy Landes	Aditya Mohite
Emilia Morosan	Gururaj Naik
Tomasz Tkaczyk	Rafael Verduzco

Smalley-Curl Institute (SCI)

Director	Naomi Halas
Executive Director	Alberto Pimpinelli
Administrator	Carol Lively
Events Specialist	Michelle Downey

Faculty

Faculty members have a myriad of responsibilities including the advisement and mentoring of students, research in their areas of interest and expertise, managing the financial aspects of their labs, and instruction at the undergraduate and graduate level.

The primary faculty contact for first-year PhD students is the Applied Physics Program Chair. Once students have affiliated, the primary point of contact becomes the advisor. Students may continue to seek the guidance of the

Program Chair as well as other members of the Applied Physics Curriculum and Admissions Committee (APCAC.) The APCAC is responsible for program development and coordination of activities related to the graduate program, including assessment of progress. Specific duties include the consideration of all proposed new courses, curricula modifications, and program activities. The APCAC also facilitates resolutions to complaints involving academic or administrative decisions that may interfere with the student's academic and research progress. Additionally, the committee reviews student petitions. Students must petitions the APCAC for exceptions to academic requirements (course substitutions, transfer credits, waivers, etc.) Details of how to submit a petition are listed under the **Course Waiver Requests** section on page 13 of these guidelines.

Academic Program Support Staff

The Associate Director (AD) oversees the academic administrative functions of the academic program and should be the first point of contact for any administrative issues. The SCI Events Specialist is also available to assist with administrative questions or concerns when the AD is unavailable.

Carol Lively, Institute and Graduate Program Associate Director
301 Space Science • clively@rice.edu • 713-348-3566

Michelle Downey, Events Specialist
301 Space Science • mhdowney@rice.edu • 713-348-6008

Academics: Overview

The Smalley-Curl Institute offers an Applied Physics graduate program (APP) leading to the Doctor of Philosophy (PhD.) The program does NOT offer a stand-alone thesis Master of Science degree; students admitted to our PhD. program with a bachelor's degree are required to earn the thesis MS within the program before proceeding to the PhD in lieu of a formal qualifying exam.

Students admitted with an approved previous MS degree will need to discuss specific requirements with the Applied Physics committee chair and student's advisor for acceptance of that degree. Previous MS degrees are approved or denied contingent upon the approval of the Applied Physics Curriculum and Admissions Committee (APCAC). Some courses may still be required as core courses cannot be waived. Non-acceptance of previous MS degrees requires the student to obtain a Rice Applied Physics MS degree before continuing on to the PhD. degree.

Graduate Application

The online application for admission is located at https://apphgradapps.rice.edu/.

The application process is opened beginning on September 1. Admissions are for the fall ONLY and the deadline is during the latter half of **January**. Late applications will NOT be considered.

The application fee is $85, payable by credit card. Applicants with financial needs and other exceptions may be eligible for application fee waivers and should request via sciapp@rice.edu; please see the list of accepted waivers below.

University-paid application fee waivers include, but may not be limited to:

- IRT (Institute for Recruitment of Teachers)
- Fulbright Scholar Program
- GEM (The National GEM Consortium)

- GCURS (Gulf Coast Undergraduate Research Symposium)
- McNair Scholar Program
- Nankai University Hundred Young Teachers Program
- VEF (Vietnam Education Foundation)

Successful applicants to the PhD. program must have a minimum Grade Point Average (GPA) of 3.0 on a 4.0 scale.

The general GRE is required for admission to the Applied Physics program, but the GRE Physics subject exam is not required. If applicants have taken the Physics subject test, then scores should be indicated on the application.

Minimum TOEFL scores for international applicants are 600 (paper), 250 (computer), and 90 (iBT). The minimum IELTS score is 7.0. TOEFL and IELTS requirements for the PhD. program may be waived for students who have received a degree from a university where English is the official language of communication.

For internationals admitted to the program, proof of financial support is also required.

Our average admitted students obtain a 3.63 GPA (on a 4-point scale), GRE scores in the range of Q164 and V157 and above. The average Physics subject test score is 752. The average TOEFL iBT score for admitted international students is 100, and the average IELTS score is 7.5.

Degree Program

Students admitted to the PhD. program are funded by the Applied Physics Graduate Program for the first 9 months of study with a monthly stipend and full tuition waiver. The PhD. program is full-time only with a minimum of 9 credit hours during the spring and fall semesters (6 hours if registered in the summer.)

At the end of their first year and continuing throughout subsequent years, APP students will select a faculty advisor and affiliate with that research group, who is then responsible for funding of the student's stipend and research expenses. (See **Academic and Research Advisors** on page 10 for additional details.) They are also associated with the advisor's department of primary affiliation and enjoy day-to-day association with faculty and students in that department.

PhD. students might be required to fulfill one or more semesters of grading as required by their advisor but are not specifically obligated or required to perform any grading or teaching as part of our program's doctoral degree requirements.

A 3.0 GPA (B) must be maintained in major and minor coursework, and all classes that count toward the degree must be taken as a standard letter grade course. Only courses in which a grade of B- or above is achieved will be counted towards the MS/PhD. degrees. Students whose term GPA falls below a 2.5 will be placed on academic probation by the program. Students whose term GPA falls below 2.33 or cumulative GPA falls below 2.67 will be placed on academic probation by the university. For more information see the Academic Discipline section of the General Announcements.

Research Groups

Because of the interdisciplinary nature of the Applied Physics program, there are a number of research groups in Engineering and Natural Sciences available to students.

Some of the thematic areas include:

- Applied Mathematical Physics
- Biophysics
- Condensed Matter Physics/Quantum Matter

- Photonics and Plasmonics
- Nano/Advanced Materials
- Nanoelectronics/Nanodevices
- Atomic, Molecular, Plasma, and Chemical Physics

During the first semester of study, students are **required** to attend brown bag seminars hosted by faculty that have research openings across a broad range of disciplines. These seminars allow students to meet the faculty and learn about research being done at Rice University that is pertinent to the APP program and are hosted by Applied Physics as well as Physics & Astronomy. These seminars will help students find an area of interest, research group and advisor. Exploring a range of research areas is important because not all faculty members have resources or openings for additional students in any particular year.

By the end of the first semester, the focus should narrow to a few research groups, and the student should make every effort to speak with the most likely faculty mentors and the current students in their research groups. An informed choice requires consideration of many issues: Where are graduates of that group employed? Is funding adequate? What is the typical duration of a PhD in that group? What journals does the group publish in and how often? And most importantly, is the research interesting to you?

It is the responsibility of the student to talk with faculty about the likelihood of joining a particular research group. Students should begin these discussions as early in the fall semester as possible, especially if interest is with faculty in a department with earlier affiliation deadlines, such as Bioengineering and Chemistry. A list of current advisors can be found at https://sci.rice.edu/appadvisors.

Academic and Research Advisors

By the first week of the second semester, students should be actively engaged with a research group where they intend to eventually affiliate. No later than March 1 of the second semester, APP students will select an advisor and complete the official paperwork associated with affiliation Paperwork for affiliation can be turned in after March 1 only after discussing and receiving permission from the program chair. Starting on May 16 at the end of their first year, and continuing throughout subsequent years, the advisor is then responsible for funding of the student's stipend and research expenses. Students desiring to work with someone who is not a member of the Smalley-Curl Institute (https://sci.rice.edu/sci-member-research) may do so **only** with the permission of the Applied Physics Curriculum and Admissions Committee (APCAC). This includes faculty in the Texas Medical Center (TMC.)

Should a student choose an advisor in the TMC, the student should first attempt to contact the faculty member in the TMC. If no response is received, the student can request the program chair send an introductory email to the faculty. The student will need to find a Rice advisor as well to serve as the Rice liaison on things such as the thesis committee; the Rice advisor must meet the criteria for an advisor as defined in the GA.

At this time the students should complete the Research Proposal & Affiliation form which includes a brief description of their planned research, which must be reviewed and approved by the prospective advisor and the Applied Physics program chair. Once the advisor has been chosen, students will be hosted by the same department as their advisor. Grading is not required as part of the PhD program but students may be asked to grade/TA, depending on the preference of the host department and the advisor.

After affiliating with a research group, stipend decisions are determined by the advisor and/or the host department. Students are responsible for discussing salary issues with their respective advisors. Initial salary discussions should be held **before** officially affiliating with a research group.

Advice on Changing Research Groups or Host Department

After affiliation in the first-year, students are required to have a research advisor to remain in good standing. Rice recognizes research interests may change after a student enters a graduate program. If a student feels his/her interests and talents could be better served working with a different advisor or in another research group or department, a change can be accommodated. Although each case is unique, following are guidelines for making an advisor/group/department switches:

- Discuss issues with current advisor. Often an adjustment of research topic may resolve the problem.
- If issues are insurmountable, speak with faculty members whose research interests are more in line with the student's and who have the funding for support.
- When an alternate faculty member agrees to replace current advisor, obtain permission from the APP Chair, then proceed to the Graduate Program Administrator, who will process the documentation required for the exchange. A Change of Affiliation form will be required, along with a new research proposal.

In order to remain in good standing, the student must secure affiliation with the new advisor prior to leaving the previous advisor.

If the advisor wants to terminate financial support and a research advising relationship with a student that has officially affiliated, this requires a timely warning and a written justification to both the Program Chair and the Office of Graduate and Postdoctoral Studies. The procedures are outlined in the GA under Dismissals. A student may appeal such a dismissal through the petition and appeal process.

Honor System and Student Code of Conduct

All incoming Rice students agree to abide by the Rice University honor system. The honor system, one of the oldest and proudest traditions at Rice, is administered by the Honor Council, whose student members are elected each year by the student body. Students at Rice, through their commitment to the Honor Code, accept responsibility for assuring the validity and integrity of all examinations, assignments, products of their research, and public dissemination of their results. The Honor Council is responsible for investigation of all reported violations and for trial in those cases where the facts warrant.

Graduate students are expected to observe the provisions of the Rice University Honor Code both in their academic and research duties. Violations may result in serious penalties including a failing grade in the course and suspension from the university.

The faculty will state the restrictions applying to various forms of class work. If there is doubt about the conditions for a particular assignment, it is the student's responsibility to contact the faculty member in charge of the course.

Plagiarism is a particularly thorny issue. Never explicitly or implicitly claim someone else's work as your own. See http://gpsdocs.rice.edu/orientation/Plagiarism_Hewitt_document.pdf and http://libguides.rice.edu/c.php?g=45136&p=287093 for important details.

Please refer to the Rice University General Announcements for the Honor System and Student Code of Conduct for more information.

Research and Scholarly Activities

Please refer to the Rice University General Announcements regarding Research and Scholarly Activities, as well as the following Rice policies: 324-00 Research Misconduct, 326-98 Human Health and Safety in the Performance of Research, 333 Patent and Software Policies, and 334 Copyright Policy.

Program Learning Outcomes

Students graduating in the program will:

1. Acquire and demonstrate advanced knowledge in the foundational applications of physics including familiarity with past and current scientific literature in their specialization.
2. Develop the ability to conduct independent applied physics research including the aptitude to identify, formulate, and overcome challenging scientific and engineering problems in this endeavor.
3. Make an original and significant technical contribution in their chosen specialization area.

Email as a Formal Mode of Communication

Recognizing the increasing need for electronic communication with students, the Applied Physics Graduate Program recognizes and utilizes email as **the official means of communication** with students. The program will routinely send official communications to students via their university email address. Because email is a primary mechanism for sending official communications to students, and certain communications may be time-sensitive, students should check their email at least daily. *Failure to read official university communications sent to the student's official Rice email address does not absolve students from complying with the content of said emails.* Students are expected to communication official business with the institute and program using their Rice email accounts. Gmail and other non-Rice email systems are not acceptable for official business.

Coursework

Course Registration

University policy requires students maintain their student status throughout their career at Rice University. Applied Physics PhD students are considered full-time students and expected to register for 6 hours of "Graduate Research and Thesis" (APPL 800) during the summer semester unless special arrangements for an internship are made in advance with their advisor. Students are responsible for registering for at least 9 hours of courses each fall and spring semester to maintain full-time status.

First-year students may not register prior to orientation. Time will be provided to register for courses at the end of the program orientation. Representatives from the Applied Physics Graduate Student Association (APGSA) will be available to provide technical assistance. Academic advice will be provided by the program chair. The chair will also provide academic assistance/advising for the second semester. If students require academic assistance/advising after their first semester, they should seek advice from their faculty advisor and ensure that the advice is in alignment with Applied Physics requirements.

Students register for courses online through their Esther account. For a list of registration deadlines, consult The Office of the Registrar's website at www.registrar.rice.edu. Current and upcoming academic calendars can be found at https://registrar.rice.edu/calendars.

Core and Elective Requirements, Course Waiver Requests

The PhD. program prepares students for research careers in academia and industry. Students admitted to the PhD. program are required to complete 90 hours of credit for coursework and research, beyond the bachelor's degree. Four semesters of full-time study at Rice are also required.

The first academic year concentrates on foundational coursework followed by focus on a research area. First-year students should meet with a selected member of the APCAC and their graduate student mentor to determine first and second semester coursework. The first year consists of a minimum of 18 hours of coursework. Students will meet with their advisors to plan coursework for all subsequent years.

For the PhD. degree in Applied Physics, the student must fulfill the University requirements set forth in the catalog under which he/she entered or any subsequent catalog. The semester hour requirements may be fulfilled both by classroom hours and research hours. Nine one-semester graduate level courses of no less than 3 credits hours or higher are required, divided into 4 Core and 5 Elective courses.

The Master of Science (MS) degree is offered only as a precursor to the PhD. degree**.** It requires at least 39 semester hours of credit beyond the Bachelor's degree (typically 27 hours of course credit, as specified above, and at least 12 hours of APPL 800, Research and Thesis, credit.)

If a similar MS has already been earned under another school/program, candidates may petition their research advisor and APCAC to waive the MS requirement, though curricular requirements must still be fulfilled. If during the student's previous thesis Masters study one or more of the core courses were not taken, these must be completed before a Doctoral degree can be awarded.

Similarly, if the APCAC committee deliberates that not enough total courses were taken for the previous thesis MS, completion of a certain number of additional elective courses may be required of the student.

Core Courses:

- Quantum Mechanics I: PHYS 521 or CHEM 530
- Quantum Mechanics II: PHYS 522 or CHEM 531
- Statistical Physics: PHYS 526 or CHEM 520 or CHBE 540
- Classical Mechanics: PHYS 515
- Electrodynamics. PHYS 532
- Fluid Mechanics: CHBE 501
- Mathematical Methods: PHYS 516
- Physical Biology: BIOE 502
- Solid State Physics: PHYS 563

Elective Courses:

Five courses may be selected from a list of approved courses offered by different departments in Natural Sciences and Engineering. These are chosen according to the research directions of the student. The up-to-date list is maintained at http://sci.rice.edu/curriculum. Other courses may be considered to count as electives on a case-by-case basis by petitioning and obtaining approval from the APCAC. See Appendix A for a list of suggested specialization curricula.

Course Credit Transfers and Elective Credit Requests:

Particular Core course requirements may be transferred for students who have had similar courses elsewhere and who demonstrate a thorough knowledge of the material in the course at Rice. To receive a course transfer credit,

the course cannot be part of the credits for a previous degree, a copy of the official transcript must be provided, a copy of the class description from the syllabus must be provided, and the Graduate Transfer Request for Credit must be completed. (Visit the Office of the Registrar's website for university guidelines at http://registrar.rice.edu/students/grad_transfer/) The concurrence of the faculty member teaching the relevant course at Rice and the APCAC must be obtained in writing.

For elective classes completed at Rice and not on the Approved Electives list, the approval of APCAC is required. Elective courses must be no less than 3 credit hours to be eligible. **To make a request, send an email to sciapp@rice.edu with the Course Number (APPL 800), Title, Instructor, Term (Fall 2017), Description, and any restrictions, prerequisites, and corequisites, noting that the request is for credit for an elective not on the approved list.** The course information can be found at https://courses.rice.edu.

No courses may be used for fulfilling both Core and Elective requirements. Due to overlap of curricula, only one from each of the pairs PHYS 521/CHEM 530, PHYS 522/CHEM 531, and PHYS 526/CHEM 520/CHBE 540 may be used for the nine required courses. No courses previously used to fulfill the requirements of a Bachelors or professional Masters or other degree will be accepted as course electives, and in the case of acceptance of a core then a substitute course must be chosen in its place to meet the full 27 credit hours required.

Qualifying exams of the host department will not be required of the APP students. However, for the students' own benefit we strongly advise that they enroll in any required seminar courses required by the advisor once they affiliate with a research group.

Grades, Department Duties, Employment, Academic Status

Grades:

University guidelines state that to graduate, students must achieve at least a B- (2.67) GPA in each course counted toward the graduate degree. Some programs and departments have more stringent standards. For the Applied Physics program, the overall Grade Point Average of all Core and Elective Courses must be a B (3.0) or better, with a grade of at least B– (2.67) in all courses. A Core course may be repeated once to bring the grade up to this level, applicable to a maximum of 2 Core courses. Any course in which a grade of C+ or lower is received must be repeated. For repeated Core courses, the GPA calculation for satisfaction of this requirement will not include the first grades of repeated Core courses.

To compute GPAs, the credits attempted in semester hours for each course and the points for the grade earned (from A+ = 4.33 to F = 0.00) are multiplied, then the products (one for each course) are added together, and the sum is divided by the total credits attempted. Please note the GPA for courses is calculated separately from seminars and research & thesis courses.

Satisfactory/Unsatisfactory:

Some departments may assign a grade of Satisfactory (S) or Unsatisfactory (U). Students should be aware that while a grade of S or U does not affect their Grade Point Average, no credit will be awarded if a grade of U is received. Courses with a grade of S will count towards total credits earned but not towards the core and elective course requirement.

Incompletes:

Instructors report this designation to the Office of the Registrar when a student fails to complete a course because of verified illness or other circumstances beyond the student's control that occur during the semester. For an incomplete received in the fall semester, students must complete the work by the

end of the fourth week of the spring semester or an earlier date as defined by the instructor, and instructors must submit a revised grade by the end of the fifth week. For an incomplete received in the spring semester, students must complete the work before the start of the fall semester or an earlier date as defined by the instructor, and instructors must submit a revised grade by the end of the first week.

Audit:

The grade designation of Audit (AUD) is used for people auditing a course, and specifically when the auditing student has met the audit requirements of the course. A grade designation of NC is given to students who do not meet the audit requirements. Requests to audit a class or to change from audit to credit or vice versa must be done by the end of the second week of the semester. Audit classes do not count toward the core and elective course requirement.

Departmental Duties of the Doctoral Advisor

In most research degree programs, students may be asked to complete a limited amount of teaching or perform other services as part of their training. Assigned duties should not entail more than 10 hours per week, averaged over the semester, or extend over more than eight semesters. All APP students may be requested by their advisor as part of their graduate education to perform some teaching and/or grading. The precise duties are set by the advisor's primary department, which subsequently provides written certification of fulfillment of teaching/grading responsibilities to the APP.

Academic Status

The student's research advisor and the APCAC will review the student's research progress and academic status each semester to ensure the student is making satisfactory progress in the program. Satisfactory progress is defined as completing the course and research requirements as detailed in the degree timeline (page 13-14), maintaining a term average of at least 2.5 and submitting annual progress reports by the deadline; and students are strong encouraged to complete the MS degree by the end of the third year with an approved exception no later than 4 years. The student and advisor are required to complete an annual online progress report. (See **Annual Reviews** on page 22 for additional details.)

The APCAC will review the grades and affiliation process to determine progress of first-year students. Any problems regarding the student's performance will be discussed at this time.

Students must maintain continuous program involvement and enrollment unless granted an official leave of absence. See Leaves and Withdrawals in the General Announcements for more information.

Host Department Seminars, Classes, and Qualifying Exams

Qualifying exams of the host department will NOT be required of the Applied Physics students. APP students achieve the MS thesis degree in lieu of any qualifying exam.

Applied Physics students will follow the requirements of the program (4 core courses and 5 electives) and not the requirements of the host department.

However, for the students' own benefit we strongly advise that they enroll in any required seminar courses and classes requested by the advisor.

Timelines and Procedures, Candidacy and Defense

Degree Timeline

Year One

- Complete at least 6 courses of the recommended and required course work over Fall and Spring semesters
- Attend Brown Bag Lunches in the Fall semester to learn about faculty research opportunities
- Begin meeting with potential research advisors
- Meet with APGSA Mentor monthly until affiliation
- Officially affiliate with advisor/research group no later than March 1
- Complete Annual Progress Review in early May
- SUMMER: Register for 6 hours of APPL 800 unless on internship or other leave

Year Two

- Finish required coursework during Fall and Spring semesters
- Register for APPL 800, Graduate Research & Thesis (minimum of 3 hours)
- Continue research
- Grade/teach if requested by host department
- Complete Annual Progress Review in early May
- SUMMER:
    - Register for 6 hours of APPL 800 unless on internship or other leave
    - Work with advisor to determine MS Thesis Committee
    - Submit MS Petition for Candidacy by Aug 15

Year Three

- Register for at least 9 hours of APPL 800 each semester
- Continue research
- Grade/teach if requested by host department
- Complete Annual Progress Review in early May
- Defend MS Thesis by May 15
- SUMMER:
    - Register for 6 hours of APPL 800 unless on internship or other leave
    - Work with advisor to determine Doctoral Thesis Committee
    - Submit PhD Petition for Candidacy by Aug 15

Year Four and Beyond

- Year 4: Register for MS Degree conferral (if not completed during previous summer)
- Register for at least 9 hours of APPL 800 for Fall, Spring, and 9 hours for Summer
- Continue research
- Grade/teach if requested by host department
- Complete Annual Progress Review in early May of each year, including final year

- Defend Doctoral Thesis by May 15 (year to be determined with advisor)

NOTE: The Applied Physics requirement is achievement of the PhD within 6 years of the BS degree and 4 years with an accepted previous MS degree. Year 8 is the university deadline for defense and completion of PhD before end of Spring semester. Students should make every effort to complete their degrees sooner.

M.S/PhD. Timelines and Procedures

Barring a written exemption from the APCAC, the MS must be completed within 3 years of entering the program, the PhD. from B.S. within 6 years. If you have a previous Master's degree accepted by the APCAC, the PhD. should be achieved in 4 years. The program does NOT offer a stand-alone thesis Master of Science degree; students admitted to our PhD. program with a bachelor's degree are required to earn the MS within the program before proceeding to the PhD.

NOTE: approved previous MS degrees will be evaluated on a case-by-case basis by the APCAC. (See **Core and Elective Requirements, Course Waiver Requests** on page 13 for more information.)

Petitioning for Candidacy

Candidacy marks a midpoint in the course of graduate education. Achieving candidacy for the PhD/DMA signals that a graduate student has: (a) completed required course work, (b) demonstrated the ability for clear oral and written communication, and (c) shown the ability to carry on scholarly work in his/her subject area.

Master's students must be approved for candidacy before the beginning of their fifth (5^{th}) semester of enrollment at Rice; PhD students must be approved for candidacy before the beginning of their ninth (9^{th}) semester of enrollment. Students who are approaching or who have passed their deadline to candidacy must submit an extension of candidacy request to the Office of Graduate and Postdoctoral Studies. Students who exceed their time boundaries without an approved extension request will be charged a fee of $125 for reinstatement to good standing.

Before candidacy is approved, a thesis committee consisting of **at least** three tenured or tenure-track faculty or research fellows is selected by the student and advisor. At least two of those members should have an appointment at Rice University.

The chair of the thesis committee is either the advisor* or in the host department of the student, and is affiliated with the program. The second member of the committee is affiliated with the program. The third committee member of these programs must not be affiliated with either the student's graduate program or the department where their advisor has their primary appointment. Thesis committee make-up is approved by the chair of the program, with final approval given by Graduate Studies. See the General Announcements for the formal structure of the thesis committee.

*If the advisor is outside of Rice University, then the committee Chair must be the student's Rice advisor. The non-Rice advisor can serve as the Thesis Director.

MS Candidacy and Defense

When a student has completed the requisite hours (33 from within the PhD. course plan), has established a committee, and has performed research, the Petition for Approval of MS Candidacy form is submitted to the Graduate Program Administrator by no later than the end of the 4th semester (second year). If the end of the second year falls during May, the student has until August 15 to complete the petition. The administrator will

provide the statement of applicable department requirements, a copy of the transcript, and the student's checklist to candidacy. The form requires the Program Chair's signature and approval by the Office of Graduate and Postdoctoral Studies (GPS), which will be obtained by the Administrator.

For guidelines on writing the thesis, visit the following websites for information.

- Thesis Template Documents
- Thesis Format Guidelines
- Frequently Asked Questions

When the student is ready to defend, the student then receives an initialed Approval of Candidacy form, which is signed by members of the student's committee upon passing the MS defense. One week prior to defending (a minimum of 7 full days), the student must submit the following information to the Office of GPS, via the Rice Events Calendar: defense date, time, location, title and abstract, as well as the names, titles and departments of committee members.

The Approval of Candidacy form is copied to the student's file and submitted to GPS. The student has six months to submit his/her signed thesis to GPS, at which time the student becomes a Master's Degree Candidate. Students must satisfactorily complete all required coursework prior to submitting a final thesis. Degrees will not be awarded until all coursework requirements are completed. Additionally, if a student plans to defend and submit a thesis for the next degree conferral, students must file their applications for approval of PhD and MS candidacy in the Office of Graduate and Postdoctoral Studies by the end of October for December degree conferral and by the end of February for May degree conferral.

For full information, visit http://graduate.rice.edu/thesis/.

PhD. Candidacy and Defense

In order to petition for PhD. degree candidacy, a student must have completed 72 semester hours of advanced studies as approved by the program and achieved at least a 3.0(B) average in core and elective courses, and earned a Master of Science degree from Rice University, or have an equivalent Master of Science degree, as decided by the APCAC.

The Petition for Approval of PhD. Candidacy form is then submitted to the Graduate Program Administrator before the start of the 9th semester (fifth year). The administrator will provide the statement of applicable department requirements, a copy of the transcript, and the student's checklist to candidacy. The Program Chair's signature is required on the petition, which is then submitted to the Office of Graduate and Postdoctoral Studies (GPS) for approval.

For guidelines on writing the thesis, visit the following websites for information.

- Thesis Template Documents
- Thesis Format Guidelines
- Frequently Asked Questions

When the student is ready to defend, the student then receives an initialed Approval of Candidacy form that is signed by the student's committee members upon passing the PhD. defense. The student must also have completed any grading requirements for the host department and notify the Program Administrator with the details at sciapp@rice.edu. Two weeks prior to defending (a minimum of 14 full days), the student must submit the following information to the Office of GPS and the Rice Events

Calendar: defense date, time, location, title and abstract, as well as the names, titles and departments of committee members.

The Approval of Candidacy form is copied to the student's file and submitted to the Office of GPS. The student has 6 months to submit a signed thesis to the Office of GPS, at which time the student becomes a Doctoral Degree Candidate.

Additionally, if a student plans to defend and submit a thesis for the next degree conferral, students must file their applications for approval of PhD and /MS candidacy in the Office of Graduate and Postdoctoral Studies by the end of October for December degree conferral and before the end of February for May degree conferral.

For full information, visit http://graduate.rice.edu/thesis/.

Degree Candidate Status

Degree Candidate Status indicates the student has completed all requirements for the degree and all that remains is degree conferral in January, August, or May.

Visit https://registrar.rice.edu/calendars for important deadlines by semester.

Financial Support and Time Off

Financial Support

Students accepted by the Applied Physics program receive a stipend from the Applied Physics Graduate Program for the first 9 months, along with a full tuition grant. Compensation is calculated and paid semi-monthly from August 16 to December 31 and from January 1 to May 15.

By the first week of the second semester, students should be actively engaged with a research group with intention to affiliate. Paperwork for affiliation is due to the APP administrator no later than March 1. Starting on May 16 at the end of their first year, and continuing throughout subsequent years, APP students will select a faculty advisor and affiliate with that research group, who is then responsible for funding of the student's stipend and research expenses as of May 16. After affiliating with a research group, stipend decisions are determined by the faculty advisor and/or the host department. Students are responsible for discussing salary issues with their respective advisors before officially affiliating with the research group. Once the student affiliates, the advisor's department of primary affiliation will become the student's host department.

If the student is funded by an external fellowship, scholarship, training grant, or other source of external funding which covers all or a portion of a student's stipend, then that will override the advisor-paid stipend or first-year fellowship. Students are required to notify and provide documentation to the Applied Physics administrator of any external fellowships or scholarships they receive immediately upon receiving the award, including awards received prior to matriculation. Contact the APP administrator if you have any problems with financial support.

Support Limitations

The normal limit of financial support for graduate students is dependent upon the advisor and the host department. Students should consult with the advisor for confirmation of support limitations. If the student anticipates taking longer than the limitation set by the advisor/host department, the student may consult with the Applied Physics chair in conjunction with the advisor.

Students whose funding has terminated may continue so as to finish any written publications, such as thesis and papers, but may not perform work in the laboratory environment.

If a student fails to continue to make acceptable progress, he or she is subject to partial or complete loss of financial support.

External Fellowships/Scholarships

Students are encouraged to seek external fellowships and awards. The Office of Proposal Development (http://opd.rice.edu/grad-student-postdoc-fellowship) offers an extensive array of proposal development services when developing and writing proposals for federal grant agencies and other entities to seek funding for their research projects.

If a student receives an external award, the following apply:

- If the total amount of the fellowship, including stipend, insurance, etc. is below the current stipend, the student should discuss supplemental support with the advisor. The host department policies will dictate supplements.
- If the student's external support ends or is revoked during the student's studies at Rice and the student is achieving satisfactory performance, reasonably progressing toward the degree, and funding is available, the student will receive stipend support from the advisor.

Internships

Occasionally industrial internship opportunities arise for doctoral students. Pursuit of an internship while remaining a doctoral student must be approved in advance of the relevant semester by the advisor. For domestic students, the main concern is that the internship not delay timely progress toward the graduate degree. For foreign students, there can be considerable complications regarding the visa status – this requires detailed discussions between the student, the Office of International Students and Scholars (OISS), and the advisor, and there are strong requirements that the topic of the internship be integral to the student's doctoral research in order to be approved.

In case of external fellowship support, it is the student's responsibility to ensure that an internship does not conflict with the conditions of such a fellowship.

Students participating in internships do not receive a graduate stipend during the period of the internship. Financial arrangements must be finalized with the advisor and the Applied Physics administrator prior to the internship, in time for necessary procedures to be completed (generally April 15 for a summer internship.) Students must provide documentation of the internship to the Applied Physics administrator for record keeping.

Details for international student internships with regard to Optional Practical Training (OPT) and Curricular Practical Training (CPT) are located at http://oiss.rice.edu/opt.

Time Off

Vacation and Holidays

During the first year of study, graduate students observe the same holiday schedule as other students engaged in course work. Beginning in the third semester, doctoral students engaged in research follow the staff holiday schedule, including winter break when the university is officially closed.

Rice is not officially closed during fall midterm recess, spring recess, or spring break. PhD students do not automatically receive these dates as time off. All requests for vacation time, including fall or spring recess or spring break, must be approved in advance by the student's advisor. Students should also discuss paid vacation time policies with their respective advisors.

Unscheduled Time Off

PhD students must actively participate in required academic activities, including laboratory work, as a basic condition of financial support. Absences, other than medical and family emergencies, must be approved by the advisor in advance. In the case of medical and family emergencies, notification is expected in as timely a manner as possible depending on the specific situation.

Students who are not present and carrying out required academic activities for more than one week, without approval of the absence, will receive an immediate written warning.

Students who are absent from required program activities for a contiguous two weeks without permission and without mitigating circumstances may be subject to termination of financial support. Such absences may be taken as an indication that inadequate academic progress is being made.

Interruptions of Study and Withdrawal

Leaves of Absence

A leave of absence (LOA) may be granted only by GPS and is granted only to students in good standing. Leave must be approved in advance of the academic semester in question. A leave of absence will not be granted after the student has registered for courses or after the registration period has passed. Normally, a leave of absence is granted for no more than two consecutive semesters. No work toward a degree may be completed at Rice (or involve Rice faculty/facilities) during a student's LOA. Students must pay a reinstatement fee of $125 upon their return from an official leave.

The LOA form can be found at http://gpsdocs.rice.edu/forms/LOA-request.pdf. The form should be completed and submitted to the Applied Physics Administrator.

Short-Term Medical and Parental Release

If a graduate student cannot fulfill the duties of his or her appointment due to a medical emergency or the adoption or birth of a child, the student may be temporarily released from their academic responsibilities. Enrollment and stipend support may be continued for up to six weeks or until the appointment expires (whichever occurs first). A student may apply for short-term medical (STMR) or parental (STPR) release at any

time during the semester. Please see https://graduate.rice.edu/leaves for additional details. The form for completion can be found at http://gpsdocs.rice.edu/forms/Parental_STML_Request_Form.pdf.

Nonmedical Withdrawal and Readmission

Students who wish to withdraw from Rice during the semester, for any nonmedical reason, are to notify the chair of the Applied Physics program in writing. Failure to register for any period without a leave of absence granted by the Office of Graduate and Postdoctoral Studies constitutes a de facto withdrawal. Students who later wish to resume study after a voluntary or de facto withdrawal must petition for readmission to the university. Readmitted students must pay a readmission fee of $350.

Please see https://graduate.rice.edu/leaves#nonmedwithdrawal for additional details and http://gpsdocs.rice.edu/forms/WithdrawalForm.pdf for a copy of the withdrawal form.

Medical Withdrawal and Readmission

Graduate students may request a medical withdrawal from the university by applying in writing to the Office of Graduate and Postdoctoral Studies at any time during the semester, up until the last day of classes; the withdrawal does not take effect until approved in writing. Email communication is considered to be "in writing." Graduate students who wish to seek readmission following a medical withdrawal must submit to the Office of Graduate and Postdoctoral Studies a written petition for readmission no later than June 1 for the fall semester and November 1 for the spring semester after the medical withdrawal.

Visit https://graduate.rice.edu/leaves#medwithdrawal and http://gpsdocs.rice.edu/medical_withdrawals/medical_withdrawal_readmission_petition.pdf for details; the withdrawal form can be found at http://gpsdocs.rice.edu/forms/WithdrawalForm.pdf.

Best Practices in Mentoring, Progress Reviews, and Program Effectiveness

First-Year Mentorship and Guidance

At the start of the fall semester, students will meet with members of the APCAC to help them determine which courses to take the first semester and beyond. During the fall semester of the first year, brown bag seminars will be held. These seminars allow students to meet faculty and learn about research being done at Rice University that is pertinent to the APP program, as well as help students find an area of interest, research group and advisor. During the first year, students will also be assigned a senior Applied Physics student to assist with course selection, finding an advisor, introduction to the Applied Physics Graduate Student Association, familiarization with Rice, and life in Houston.

Presenting and Publishing Research

Rice University is a graduate research institution where students are expected to publish research papers and present at national/international conferences in the students respective fields. In addition to this, the students will have an opportunity to present on campus in the annual SCI Transdisciplinary Symposium and/or annual SCI Summer Colloquium as well as host department seminars, symposiums, and colloquia.

Annual Reviews

Students and advisors complete a progress report in May of each year to discuss the academic and research progress made in the program towards the awarding of the doctoral degree. See Appendix C for a copy of the 2016-17 student progress report. These reviews are collected and evaluated by the APP leadership and are kept confidential. If there is any difficulty with a student progressing in the program, a meeting between the student, advisor, and chair of the program will occur each semester until such issues can be resolved.

Graduating Students and Alumni

Graduating Applied Physics students are asked to complete an exit interview and occasional surveys are sent to alumni to obtain their continued feedback and overall perspectives on the program.

Graduate Student Associations

The Graduate Student Association (GSA) comprises degree seeking graduate students at Rice University. The GSA mission is to enrich the graduate experience and to represent, support, and promote graduate student interests and values. An integral and essential part of the Rice community, the GSA provides programs and services in aiding in recruitment and retention of graduate students, represents graduate student interests to the University administration, and builds a strong sense of community both on and off campus.

Each department on campus has its own GSA, and although APP is not its own department, it has a non-voting branch. The Applied Physics Graduate Student Association (**APGSA**) was founded in 2011 to represent the interests of Applied Physics students at Rice. The primary functions and goals of the APGSA are to promote professional growth of graduate students, to serve as a representative in voicing the concerns of its members, and to promote professional and personal relationships amongst graduate students, faculty, and the community. Contact the APP administrator or visit http://sci.rice.edu/apgsa for APGSA details.

General Information

ESTHER (Employee and Student Tools, Help, and Electronic Resources)

The ESTHER system is a web application used by all students, faculty, and staff. For information on how to use ESTHER, visit http://registrar.rice.edu/students/ESTHER_FAQs/. Student resources in ESTHER are listed below:

- Update your contact information
- Register
- Add and drop courses
- View your course schedule
- Access your final grades
- View and print your unofficial transcript
- Obtain enrollment verifications
- View time boundaries
- Print your degree application
- View course and instructor evaluation comments for previous semesters

- Identify holds on your account
- View financial aid information
- View your employment information, such as pay stubs
- Review charges and payments
- Pay your account online
- Changes to forms (W4 and direct deposit information)
- Download W2 forms

Campus Mail Service

All mail delivered to you using a Rice campus address should include your mail stop. The mail stop for Applied Physics is 100. First-year graduate student mailboxes can be found in the basement of Herman Brown Hall outside the student office. After affiliation, students may elect to keep their mailbox with Applied Physics or move the location to the host department. To keep your mailbox with APP, send an email request to the APP administrator.

Host Department	Mail Stop	Mailbox Location
Applied Physics	100	301 Space Science
Bioengineering	142	BioScience Research Collaborative (BRC), suite 1030
CTBP	654	BioScience Research Collaborative (BRC), suite 1005
Chemistry	60	Space Science, 1st floor
Chemical & Biomolecular Engineering	362	Abercrombie Hall, 2nd floor
Electrical & Computer Engineering	378	Brockman Hall, 3rd floor
Jacob Robinson's Group	366	Abercrombie Hall, 2nd floor
Materials Science & Nanoengineering	325	George R. Brown Hall, West, 2nd floor
Physics & Astronomy	61	Brockman Hall, 2nd floor
Statistics	138	Duncan Hall, 2nd floor

Computing

All new students are assigned a Rice Net ID username and password, which gives them access to Rice email and other resources; you can manage your account at https://mynetid.rice.edu/. See the Rice IT web pages at https://oit.rice.edu/ for more information about computing resources.

Many research groups maintain their own specialized computing facilities. They will become available to the student after affiliating with the research group.

Study Areas, Building Access, Office Space, Telephone Service

First-year students will have an office in the 301 Space Science and Technology suite and after-hours access to the building will be provided (via Rice ID.) After affiliation, students should have an office with the other students in the advisor's research group. Check with the host department administrator or coordinator to obtain an office key, gain after-hours building access, determine convenient study areas, and learn telephone service policy.

Purchasing and Expenditures

After affiliation with a research group, you may be asked to make purchases or incur other expenses on behalf of your research project. University accountants are very stringent in their interpretation of federal, state, local, and university rules that control such expenditures. Please take careful note of those policies and consult with a

staff member before incurring any expense. Under no circumstances are personal items to be charged to any university or research account.

Procurement

Procurement regulations change frequently. You are advised to consult the purchasing coordinator in your host department before attempting to make any purchases for their specific department guidelines.

Office Supplies

Office supplies purchased by the department or research grants may not be used for any personal purpose, including course work. All costs of thesis preparation, defense and submission are the responsibility of the candidate. This specifically includes paper, transparencies and printing or copying costs for drafts, defense, and library versions.

Copying Services

First-year students will be provided access to print/copy in the Smalley-Curl suite, limited to 30 black-and-white pages per month.

After affiliation, check with your host department for the location and usage of copiers available for research and departmental use as needed. You may be given a charge code for the appropriate machine.

Note that government funds cannot be used to prepare an application for a government grant and that personal use of copies is not allowed.

There is a large-format (36" wide) color printer located in Geology. Department staff can provide access on how to access this unit. Large format printing is also available through IT (in the MUDD building) at lower cost.

Mailing and Shipping

All items to be mailed or shipped must be routed through the main department office. Department staff will help you arrange an appropriate carrier and payment.

Travel

Student travel must be authorized by the principal investigator of the project to which the travel will be charged. The host department may be able to provide supplemental funds for students presenting papers at meetings, but only for one trip per year. Contact the host department administrator or coordinator to request assistance with travel and for rules and regulations regarding travel.

Rice University Travel Policy applies to all Rice University employees, students, and guests.

Graduate and Postdoctoral Studies Office (GPS)

Graduate Student Policies

Please visit https://graduate.rice.edu/policydoc to review the graduate student policies that all graduate students are expected to abide by while at Rice University. Please contact the APP administrator prior to visiting GPS.

Guidelines for Dismissals, Petitions, Appeals, Grievances, and Problem Resolution

These goals of these guidelines are to obtain compliance with Rice's policies while striving to uphold standards and raise the quality of graduate programs, as well as to provide graduate students with an environment that has high standards, clear assessments of their achievements, and fair and transparent procedures for handling cases

of inadequate academic progress. See https://graduate.rice.edu/discipline for details. Exceptions to the rules will be handled on an individual basis.

Leaves or Withdrawals

Leaves or withdrawals include short-term medical and parental release, leaves of absence, medical and non-medical withdrawal, and involuntary withdrawal. Readmission and non-enrollment restrictions are also included.

Funding and Stipends

Most graduate students are provided with stipends of one kind or another for the duration of their graduate study at Rice, and many departments offer multi-year financial assistance to students who are making normal progress towards a graduate degree. For more information, visit http://graduate.rice.edu/funding.

Please note that ALL vacation requests must be pre-approved by your advisor. If your day-to-day advisor works outside of Rice University, you must also notify the program administrator to ensure that all Rice requirements and guidelines are met.

Time Boundaries

In addition to the student's individualized time boundaries in Esther, general time boundaries can be found on the GPS website at: https://graduate.rice.edu/boundaries

Thesis Information

Please read the information at http://graduate.rice.edu/thesis for achieving candidacy, defending and submitting your thesis.

Graduate Form Library

The Graduate Form Library contains a list of up-to-date forms for graduate students including:

- Candidacy Petitions
- Requests for Extension of Time to Candidacy
- Defense Announcements
- Requests for Extension of Time to Defend
- Thesis Submission Forms
- Degree Conferral Forms
- Commencement

Guidelines for Good Practices in Graduate Education

High-quality graduate education depends upon professional and ethical conduct by all participants. Although Rice University is composed of many distinct disciplines and programs, we, its faculty and students, nevertheless form a single scholarly community. As such we have communal responsibilities for upholding academic standards and sustaining a creative, collegial environment. See https://graduate.rice.edu/goodpractices for more information.

Digital Scholarship Archive

Rice Digital Scholarship Archive (https://scholarship.rice.edu) is Rice's institutional repository, a web site where the university's intellectual output is shared, managed, searched, and preserved. Most materials come from Rice faculty members' research, electronic theses and dissertations, and digitized collections of rare or unique books, images, musical performances, and manuscripts.

Office of the Registrar (OTR)

Academic Calendars - https://registrar.rice.edu/calendars

Course Schedule - https://courses.rice.edu/

Forms for Current and Graduate Students - https://registrar.rice.edu/online_forms

General Announcements (GA)

Rice University General Announcements - https://ga.rice.edu/graduate-students/

The GA includes information about academic opportunities, academic policies and procedures, student services and organizations, student rights and responsibilities and more. Be sure to review the Regulations and Procedures for All Graduate Students at https://ga.rice.edu/graduate-students/academic-policies-procedures/.

Office of International Students and Scholars (OISS)

International Students - http://oiss.rice.edu/student

Includes the following:

- Obtaining I-20 for F-1 visa
- Short-term Visiting Research Students
- Pre-Arrival Information
- Orientation
- Maintaining Status
- Academic Resources
- Employment
- Students on OPT
- Travel
- Applying for a Social Security Number (generally eligibility is towards the end of the first year)

Student Health Insurance and Services

Health Insurance

Rice University requires all students to have health insurance coverage. Therefore, students may enroll in the Rice Student Health Insurance Plan by completing a Health Insurance Application or request a Waiver of insurance if comparable coverage is in place with another insurance provider. Visit http://studenthealthinsurance.rice.edu/ for more information.

Student Health Services

The Rice Student Health Services provides preventive and outpatient clinical care for the students of Rice University. Student Health is located on-campus and is dedicated to meeting the unique needs of

undergraduate and graduate students, with an emphasis on prevention. Their website is https://health.rice.edu/.

Students may not register for classes until the Health Data Form has been properly completed and submitted to Student Health Services.

The Rice Wellness Center

The Rice Wellness Center website offers a variety of resources to help you navigate your well-being journey, from topics on common student concerns, to opportunities for more involvement in wellness, and more. It also includes information on the Rice Counseling Center.

Title IX

Rice encourages any student who has experienced an incident of sexual, relationship, or other interpersonal violence, harassment or gender discrimination to seek support. There are many options available both on and off campus for all graduate students, regardless of whether the perpetrator was a fellow student, a staff or faculty member, or someone not affiliated with the university.

Students should be aware when seeking support on campus that most employees are required by Title IX to disclose all incidents of non-consensual interpersonal behaviors to Title IX professionals on campus who can act to support that student and meet their needs. The therapists at the Rice Counseling Center and the doctors at Student Health Services are confidential, meaning that Rice will not be informed about the incident if a student discloses to one of these Rice staff members. Rice prioritizes student privacy and safety, and only shares disclosed information on a need-to-know basis.

If you are in need of assistance or simply would like to talk to someone, please call Rice Wellbeing and Counseling Center, which includes Title IX Support:

Extension 3311 or 713-348-3311

Policies, including Sexual Misconduct Policy and Student Code of Conduct, and more information regarding Title IX can be found at safe.rice.edu.

Appendix A: Suggested Specialization Curricula

Please note that the below courses are not a full list of possible electives for each specialization area. Not being listed here does not mean that a course cannot count as an elective for a specialization area.

Applied Biological and Soft Matter Physics

Suggested core courses: BIOE 502, CHBE 501, CHBE 540, PHYS 515

Suggested elective courses:

BIOE 551	Molecular Biophysics
BIOE 584	Lasers in Medicine and Bioengineering
BIOE 589	Computational Molecular Biophysics
BIOE/PHYS 610	Methods of Molecular Simulation
BIOE 684	Advanced Biophotonics
CHBE 560	Colloidal and Interfacial Phenomena
MSNE 555	Materials in Nature and Biometic Strategies
MSNE/CHBE/CHEM 597	Polymer Synthesis, Soft Materials & Nanocomposites
PHYS 551	Biological Particles
PHYS 552	Molecular Biophysics

Applied Chemical Physics

Suggested core courses: CHEM 530, CHBE 501, PHYS 526, PHYS 563

Suggested elective courses:

BIOE/PHYS 610	Methods of Molecular Simulation
CHEM 531	Quantum Mechanics II/Quantum Chemistry
CHEM 533	Nanostructure & Nanotechnology
CHEM 547	Supramolecular Chemistry
CHEM 595	Transition Metal Chemistry
CHEM 630	Molecular Spectroscopy and Group Theory
CHBE 560	Colloidal and Interfacial Phenomena
CHBE 590	Kinetics, Catalysis and Reaction Engineering
CHBE 615	Applications of Molecular Simulations and Statistical Mechanics
CHBE 630	Chemical Engineering of Nanostructured Materials
PHYS 539	Characterization and Fabrication at the Nanoscale

Applied Mathematical and Computational Physics

Suggested core courses: CHBE 501, CHEM 520, PHYS 516, PHYS 532

Suggested elective courses:

BIOE/PHYS 610	Methods of Molecular Simulation
CAAM 615	Theoretical Neuroscience I: Biophysical Modeling of Cells and Circuits
CHBE 615	Applications of Molecular Simulations and Statistical Mechanics
CHEM 531	Advanced Quantum Chemistry
ELEC 581	Computational Neuroscience and Neural Engineering
MECH 520	Nonlinear Finite Element Analysis
MSNE 533	Computational Materials Modeling
PHYS 516	Mathematical Models
PHYS 517	Computational Methods
PHYS/ELEC 605	Computational Electrodynamics and Nanophotonics

Applied Mechanics

Suggested core courses: CHBE 501, CHBE 540, PHYS 515, PHYS 516

Suggested elective courses:

CHBE 602	Physio-Chemical Hydrodynamics
CHBE 603	Rheology
CHBE 630	Chemical Engineering of Nanostructured Materials
MSNE 523	Properties, Synthesis, and Design of Composite Materials
MSNE 535	Crystallography and Diffraction
MSNE 623	Analytical Spectroscopies: Tools in Materials Science
MSNE 634	Thermodynamics of Alloys
MSNE 650	Nanomaterials and Nanomechanics

Applied Optics & Photonics

Suggested core courses: PHYS 521, PHYS 526, PHYS 532, PHYS 563

Suggested elective courses:

BIOE 587	Optical Imaging and Nanobiophotonics
BIOE 684	Advanced Biophotonics
ELEC 562	Optoelectronic Devices
ELEC 568	Laser Spectroscopy
ELEC/PHYS 569	Ultrafast Optical Phenomena
ELEC 571	Imaging at the Nanoscale
ELEC 573	Optical Spectroscopy of Nanomaterials
ELEC 603	Topics in Micro- and Nano-Photonics
PHYS 571	Modern Atomic Physics and Quantum Optics

Applied Physical Electronics

Suggested core courses: PHYS 516, PHYS 521, PHYS 532, PHYS 563

Suggested elective courses:

CHEM 511	Spectral Methods in Chemistry
ELEC 562	Optoelectronic Devices
ELEC 573	Optical Spectroscopy of Nanomaterials
ELEC 680	Nano-Neurotechnology
MSNE 623	Analytical Spectroscopies: Tools in Materials Science
PHYS 522	Quantum Mechanics II
PHYS 539	Characterization and Fabrication at the Nanoscale
PHYS 567	Quantum Materials
PHYS 663	Condensed Matter Theory: Applications

Appendix B: Procedures for Lab Accidents

Graduate Students classified as a Fellow, Teaching Assistant (TA) and/or Research Assistant (RA) injured in the lab at Rice University are covered under Worker's compensation. Rice Student Health Center does not provide medical services for workers compensation care. Therefore students injured in the lab **should not** go Rice Health Services. The following protocol should be used for all lab injuries.

Emergency

Call Rice University Police Department at 713-348-6000 (*Do not call 911*. While this seems counter-intuitive, typical emergency responders are not familiar enough with the Rice campus to arrive at your location in the fastest possible manner. By contacting RUPD first, RUPD will not only immediately notify 911 of the accident but will also expertly direct them to your location.)

• RUPD will dispatch officers to the scene and Rice EMS if needed
• In case Houston Fire Department trucks or ambulances are needed, RUPD will meet them at the entrance gates and guide vehicles to the location
• Be sure to tell the RUPD dispatcher of your location, and clearly describe the incident

If the incident involves chemicals, biological material, or radioactive materials your supervisor or someone in the laboratory should additionally contact Rice Environmental Health and Safety at 713-348-4444

• When injury or illness involves a chemical, Safety Data Sheet (SDS) should accompany the victim to the hospital.

• A First Report of Injury Form must be filed with the Director of Risk Management, VP for Administration (MS-670)

• An Accident/Incident Report must be submitted to your Department head and Environmental Health and Safety. The form is available on the Environmental Safety website at http://safety.rice.edu/

Administer First Aid, if necessary

Evacuate the area, if necessary.

Non-Emergency

Minor medical injuries/illness occurring in the workplace should be reported immediately to the injured party's supervisor. The supervisor should fill out a First Report of Injury Form (available from Risk Management https://riskmanagement.rice.edu/workers-compensation or Environmental Health and Safety http://safety.rice.edu/). Submit this form to either Renee Block at rab@rice.edu or Ana Robledo at arobledo@rice.edu as soon as possible. You can also fax the report to 713-348-5496.

If non-emergency medical attention is needed, the student should seek treatment at NOVA Clinic (workers compensation care) located 9563 Main Street. Contact Risk Management for an appointment. If transportation is not available, a request can be submitted to NOVA to provide transport.

Appendix C: Graduate Student Annual Progress Report

APPL Annual Review - Advisor Form 2016-17

NOTE: There is a separate progress report for first-year students as of May 2018

May 2016 - May 2017

Please note: ALL fields are required except secondary advisor fields. Complete only if you have a secondary/Rice advisor.

Student and Advisor Information

Student Name *

First Last

Student Email *

Student ID Number *

S

Must be between 9 and 9 characters. *Currently Used:* **1** *characters.*

Host Department *

--Select one--

Matriculation Year *

Advisor Name *

First Last

Advisor Email *

Secondary/Rice Advisor

First Last

Secondary/Rice Advisor Email *

Did you change advisors between May 2016 and May 2017? *

○ Yes ◉ No

If yes to advisor change, please provide the name of your previous advisor.

On a scale of 1-5, where 5=best/great and 1=worst/awful, please answer the following.

1. Please rate your research progress the past year: *

◉ 1 ○ 2 ○ 3 ○ 4 ○ 5

2. Please rate your enthusiasm and industriousness: *

◉ 1 ○ 2 ○ 3 ○ 4 ○ 5

3. Please rate the experience in your research group: *

◉ 1 ○ 2 ○ 3 ○ 4 ○ 5

Enter the total rating for 1, 2, and 3 above *

Please fill in your scholarly communication details from the last year

1. How many papers did you submit in the last year? *

2. How many conferences did you present at? *

Enter the total for 1 and 2 above *

3. Enter publication information (full citation and website link for each) *

Evaluation Information

A description of the section goes here.

In your own words, describe in a few sentences how things are going.
(Includes data collection, data analysis, and research design.) *

What do you hope to accomplish in the next year? *

Grading/Teaching

What teaching experiences did you have over the past year? (Check all that apply) *

- [ ] Grader
- [ ] TA
- [ ] Taught
- [ ] Co-Taught
- [ ] None of the above

Indicate below the classes(es) in which you graded/taught
(ex: PHYS 515 Fall 2015 grader) *

Submit

Appendix D: Tips on How to be a Good Researcher

- You are a junior research colleague, not a lab assistant or technical support. You are learning how to conduct research, not just how to perform experiments or calculations
- Aim at becoming a creative, independent researcher, and strive to perform novel, creative research in the process
- Think critically: always question yourself, your advisor, your colleagues, and the literature
- Read the literature: first, capture the essence of articles, not the details; then, go back to the most relevant articles and look for details where appropriate. The amount of scientific literature is huge and you have to be able to separate the important things from the less relevant
- Set long-term research goals: what do you want to achieve? Why is it important? What will you and others learn from your research?
- Set short-term objectives accordingly. Mountains are climbed one step at a time. How can you break the long-term goals into shorter-term objectives? How can you achieve the first few objectives? If you can't see a clear path, can you break down your objectives further?
- Don't take shortcuts. Often, there is a right way and an easy way to solve a problem; they rarely coincide. Choose the right way over the easy way. Build each step of your research on sound foundations as the following steps depend on it.
- Think creatively and not only when you're in the lab. Think about your problem while you shower, while you cook, while you drive, before falling asleep. If you're too tired to think creatively, take a break with your friends or family, then get back to your problem
- Work hard and persistently: a good PhD dissertation requires four to five or even more years of dedicated hard work
- You, your advisor, and your colleagues are going into uncharted territory; thus, none of you can know where the dead ends are. Making mistakes and meeting dead ends is normal. Overcome frustration, learn from mistakes, and improve. Keep trying new things every time
- Once you've thought hard about a problem, challenge your thinking with your colleagues, advisor, and other professors. Explain to them what you're trying to do and how, in both formal and informal settings. Don't be afraid to look stupid; the only people who have no stupid ideas are those who have no ideas. Listen critically to your colleagues' replies for any useful advice. Can they point you towards useful work in other areas you have overlooked? Do they know of methods, materials, theories, etc., that you can bring to support your problem?
- Set high standards for yourself first and then for your collaborators
- You are an adult and there is a presumption that you will take responsibility and initiative – these are certainly necessary for a doctoral degree! Please ask questions and keep on top of deadlines and requirements.