

Graduate Student Handbook

1 Provenance

In consultation with the graduate students and faculty of the Department, this Handbook has been created to codify many current practices and to inform as completely as possible current and prospective students of their rights and responsibilities as members of the Columbia Astronomy community. Nothing herein is to be construed as limiting the dynamic, idiosyncratic, free-wheeling nature of an academic community such as ours. Rather, the goal is to make clear general expectations for success in the program, and to spell out various internally and externally imposed requirements (the former of which are always open to discussion, while the latter rarely are).

A serious attempt will be made to keep this document up to date. To this end, divergence between current practice and the material contained herein should be pointed out to the Department Chair or other relevant faculty members when such divergence is noted.

2 Introduction

Graduate students in the Department of Astronomy at Columbia are considered by the faculty to be apprentice scientists. As such, their main responsibility is to learn as much as possible of the subject, the techniques, the lore, and the culture of astronomy through active participation in the life of the Department – in classes as both teachers and learners, in colloquia as active participants with visitors, and in all aspects of the research enterprise. Like good scientists, they should think about research every day; the puzzles they are working on should always be occupying at least a small corner of their minds. They should talk about the science they are doing and listen to what others are doing, be curious about fields outside of their own and keep up to date in the literature. Most of all, they should enjoy this life as a scientist.

3 Financial Support

Admission to the Columbia graduate program normally is made in conjunction with a Columbia Graduate Fellowship. The Fellowship includes an annual (twelve-month) stipend (for 2018/2019, \$39,133 per year), payment of tuition and basic health coverage. The student is responsible for some additional facilities fees (please contact our department administrator, Mildred Garcia, for clarification of what these fees are). The Fellowship continues throughout the student's career (with annual increments in salary as determined by the Graduate School – and thus, largely beyond the Department's control). In addition, incoming students are guaranteed access to Columbia housing. It is important to become informed about the housing selection process well in advance of arrival in New York; the Departmental Administrator should be consulted for details. It is virtually impossible to gain access to the housing system after the first year, so careful consideration should be given to any choice involving deferral of accepting a Columbia apartment until later in one's

graduate career. Housing is guaranteed for five years; annual extensions of up to two additional years are routinely granted, but extensions beyond the seventh year are very difficult to obtain.

Various opportunities for earning additional compensation are described (and circumscribed) below. It is assumed, however, that graduate study in the program is a full-time occupation; students contemplating pursuit of substantial, long-term activities outside of the program are advised to discuss the matter with the Director of Graduate Studies (DGS) or another faculty member.

Please see the annotated handbook maintained by the graduate students on the department wiki at: <https://docs.astro.columbia.edu/wiki/Graduate%20student%20information> for additional advice.

4 Course and Examination Expectations

There are no formal course requirements for the Ph.D. However, for virtually all students, a Master's Degree is the first step along the road to the doctorate. The M.A. in Astronomy at Columbia requires 30 points of graduate credit. Six of these points are usually for research conducted as part of the first- and second-year projects and are awarded for the annual completion of Research Seminar (see below). Fifteen points must be earned in the five core courses:

- 6001 Radiative Processes
- 6002 The Interstellar and Intergalactic Media
- 6003 Galaxies
- 6004 Stellar Structure and Evolution
- 6005 Physical Cosmology

If incoming students wish to be excused from any of the required courses they should meet with the DGS in their first semester upon entering the Department with evidence (course syllabus and transcript) that they have taken an equivalent advanced course. The DGS will either agree to recommend the transfer of course credit to fulfill the requirement, or suggest they meet with the course instructor (or prior course instructor if the course is not currently being offered) for a more detailed assessment. If the transfer request is not allowed on the basis of the course syllabus alone, the student may request to take an exam to demonstrate their knowledge of the material. If for some reason a student finds that they are lacking pre-requisite knowledge for one of the core classes, they may defer that particular topic until completion of the necessary undergraduate or graduate courses. This will not exempt them from any of the required curriculum or research responsibilities, but can defer the completion of coursework beyond their second year.

The remaining points can be earned in other Astronomy graduate courses, in seminars, and/or in courses from cognate departments in the University (e.g., Physics, Mathematics, Applied Physics and Applied Mathematics, etc.) Other regularly offered Astronomy courses include:

- 8001 Observational Astronomy
- 8002 Extragalactic Astronomy
- 8003 Fluid Dynamics
- 8200 Special Topics Seminar

Students are encouraged to suggest topics for the Special Topics Seminar.

The M.Phil. degree is conferred on students who have completed the M.A. degree, and have also passed all requirements for Ph.D. candidacy excepting the dissertation. This requires successful completion of the first- and second-year research projects and the five required core courses, as well as presentation and defense of an acceptable dissertation proposal. The degree is normally awarded after the third year in residence; students holding advanced standing (e.g., those entering with a Masters degree) may obtain the M.Phil. earlier.

Each student is required to take Research Seminar (9003/9004 for Fall/Spring). This is a meeting of first- and second-year students in which technical and scientific problems are discussed and regular research updates are given by each student.

5 Research Expectations

The central and defining requirement of a Ph.D. degree is a demonstrated ability to do independent, original research. Thus, research forms a central component of the program from the first month of the first year, and research performance is a primary criterion used in assessing whether or not each student is making satisfactory progress toward the degree. The research expectations are defined by four milestones in a student's career, outlined in sections 5.1 - 5.4 below.

In September of each year we hold ASTROFEST, a full day of talks by faculty, post docs, and graduate students on research underway in the Astronomy Department, the Physics Department and at affiliated institutions such as the Goddard Institute for Space Studies (GISS) and the American Museum of Natural History (AMNH). This event is intended to introduce incoming students to the active fields of research around the department.

Each incoming student will be provided with a desk, a configured workstation, and access to computing resources. (See <http://docs.astro.columbia.edu> for more information.)

5.1 First-year project

In September individual faculty each hold sessions with all interested first-year students to outline the possible first-year research projects available to them. By October, each first-year student is expected to have selected a research project and a mentor, and to report the arrangement to the Director of Graduate Studies.

During the course of the year, all students will regularly attend Research Seminar. In addition, it is expected that once or twice throughout the year, students will participate along with faculty and research staff by giving brief ($\sim 5 - 10$ minute), informal presentations of their work at Pizza Lunch. In May, each student will meet with a faculty committee for a formal research exam. The committee is typically composed of at least one of the research seminar instructors for that academic year, the DGS and one other faculty. The student may request for their advisor to be present if they so wish. For the research examination, each student is required to make a formal 15-minute presentation, which includes (i) context and motivation for their research project ("the big picture"), (ii) results that have been accomplished, and (iii) plans for the summer. The committee will ask questions about all three of these aspects, for at least 15 minutes. No written report is required, but students are required to hand in a copy of their presentation (e.g., PDF of powerpoint slides), for a paper record.

By September of the same year, students are expected to present a completed written report on their results in the style of a professional journal paper and to discuss their research results with a faculty committee. They are also expected to present a five-minute ASTROFEST talk. Note that while the student is the primary author of the report, it is expected to be written in close

consultation with the advisor. To begin this process the student should give their advisor a first full draft no later than August 15th.

5.2 Second-year project

The schedule and expectations for the second-year project are identical to those of the first. Students are expected to work with a different mentor on a different project, preferably in a different area of astronomy. Any exceptions to this policy must be approved by the Director of Graduate Studies after discussion by the full faculty. Second-year students are also expected to participate in the Research Seminar.

It is recognized that research projects do not necessarily follow an academic schedule, and that students may wish to continue pursuing their first-year projects in the second year. This is acceptable (even encouraged if the project promises to lead to a publication or other significant result), but it does not relieve the student of the responsibility of meeting the milestones of the second-year project.

5.3 Dissertation Proposal

By November 15th of the third year, students are expected to submit a draft of their thesis proposal to their advisor and begin the process of selecting their thesis advising committee in consultation with their advisor and the DGS. Their completed thesis proposal should be given to their committee by January 15th, and formally defended in their first advising committee meeting on the Friday after Spring Semester classes start. Subsequently, the student will meet at least twice per year (usually on the Tuesday after the end of classes in December and May) with this committee to present a progress report and discuss his or her research, along with any problems encountered. At all other times, the student should feel free to ask for a meeting of the Committee, or to consult with the Director of Graduate Studies or the Department Chair if problems are being encountered.

The thesis proposal should contain the following components: (i) introduction and motivation, explaining the background to the problem under consideration and the reason for examining it now, as well as previous work on the topic; (ii) a description of the proposed methodology, whether observational, experimental, theoretical or numerical, and some indication of the new work required to develop or apply this methodology; (iii) the proposed project or projects, with sufficient detail for readers to understand the scope of the proposed research, its strengths and weaknesses, and amount of effort required to accomplish (it is understood that in some cases it is difficult to predict accurately the proposed work over a multi-year timescale and so early projects may be described in more detail than later ones); (iv) an estimated timeline, including any possible obstacles such as proposals to acquire observing time or resources. The proposal should be written in a language and form typical of such proposals in the field, include appropriate references, and should be approximately 10 pages, following typical NSF format guidelines.

5.4 Dissertation Defense

This is a formal University procedure that must be scheduled in advance. The Defense Committee consists of three members of the Astronomy Department Faculty, along with at least one outside member (as defined by GSAS). Complete copies of the dissertation must be distributed to each member of the Committee at least three weeks in advance of the scheduled defense. Students may use Departmental resources (printers, copiers, etc.) to prepare the dissertation copies, but outside copying charges cannot, in general, be reimbursed.

For the defense itself the expectation is that all members of the committee will be present. Video-conferencing for 1 or 2 members is acceptable, but GSAS policy requires that the sponsor and chair of the committee must both be physically present.

After a successful defense, the student has six months to file the formal required copies (conforming with all University specifications) with the Graduate School of Arts and Sciences. The Department will reimburse required filing fees upon submission of receipts. Students are responsible for informing themselves as to the various deadlines attendant on the defense and filing dates necessary for graduation in either May, October, or February (the only three months in which degrees are conferred). Note that some post-doctoral positions have an absolute requirement that the degree be formally received before post-doctoral salary can be paid. Others require simply a certification letter from the Department that all requirements for the degree have been met; such letters can be obtained from the Director of Graduate Studies or the Department Chair.

5.5 Research Advisor

Graduate students must complete a research project under the supervision of an Astronomy or Physics faculty member. This internship is an integral part of the program and can take place at Columbia, Barnard College, the American Museum of Natural History or the Simons Center for Computational Astrophysics.

Graduate student research projects with Research Scientists (RS) in the Astronomy Department are possible, but must be approved in advance by the faculty. This approval is made on a case-by-case basis. In particular, the successful completion of a 1st or 2nd year project does not automatically mean a student can go on to do a thesis with a RS. If thesis work with a RS is proposed: a faculty advisor is also needed on the project and funding sources identified.

6 Student Evaluation

The primary criteria for evaluation of student progress are given above. Students must pass courses, must complete all five core courses, must complete satisfactory first- and second-year research projects, and, most importantly, must demonstrate their commitment to becoming curious, productive, and engaged scientists through participation in the intellectual life of the Department.

In addition, the Graduate School of Arts and Sciences (GSAS) requires that students complete a “Progress Report” online. Part of the form must also be completed by the DGS for first- and second-year students, and by the student’s thesis advisor after their second year.

6.1 During the First Two Years

In accordance with GSAS policy, students must also maintain a minimum cumulative grade point average (GPA) of 3.0. The cumulative GPA is derived from all courses in which a student has registered and received a grade. We note that while a C is considered a passing grade, in the absence of significant research success, such a performance could raise concerns about a student’s suitability for continuing to the Ph.D. program. Note also that, in accordance with GSAS policy, students should not hold more than one incomplete at a time.

Each student’s performance will be evaluated during the faculty meeting that follows the May Research Examination. The results of the faculty evaluation are agglomerated into a single “May Letter” – a progress report. The report will review each student’s research as well as individual interactions with faculty members; participation in events like pizza lunch and colloquium; course-

work; TA performance; and Research Seminar. Any particularly outstanding or worrying aspects will be noted in the letter.

Each student will be evaluated similarly after the September meeting.

It is up to the student to meet the expectations set by the progress reports by the next evaluation – whether in September or May. If a student does not demonstrate satisfactory progress towards candidacy during one of their research meetings, they will be asked to meet with their advisor and the Director of Graduate Studies to discuss avenues for improvement. Occasionally a student turns out to not be a good match to the program. If they have not met expectations, they may not advance to Ph.D. candidacy when evaluated in May of their second year. Alternatively, a student may request to leave the program with a Master's degree after completing an appropriate level of work. In either case faculty will work with the student to pursue an alternative educational or career path. This situation is rare and, judging from the past, occurs about once every five years.

6.2 After the First Two Years

As stated above, students who have advanced to Ph.D. candidacy will meet with their thesis committees about once every six months. After each meeting they will receive immediate verbal feedback and a written letter discussing their progress and suggestions for the future course of their research. These letters are not as formal as the progress reports received by first- and second-year students.

7 Teaching Responsibilities

Learning to communicate our subject to others, particularly undergraduate students, is an essential part of the Ph.D. program in Astronomy at Columbia. The normal course of teaching duties for a graduate student are set forth here.

7.1 First year

The aim of the teaching assignments in the first year of the program is to prepare the students for running their own astronomy labs by familiarizing them with introductory astronomy topics and approaches to teaching this material at the undergraduate-level. Because the majority of the TA responsibility is reserved for the second- year, first-year TA work should be light, on the order of 5 hours per week for both semesters. The student's primary assignment is to assist a professor teaching a 1000-level introductory astronomy class by running a one-hour weekly help session. The student is expected to work closely with their assigned professor in order to maintain familiarity with course material throughout the semester. The student and professor should discuss before classes start what their respective expectations are. A professor might require a student to attend all or most classes, help with in-class activities and sometimes help with proctoring exams. A student may be interested in leading a review session, devising one or more homework sets and/or give a lecture. The student will NOT be expected to grade homeworks. To gain familiarity with the lab courses, the student will also attend and assist two lab sessions each semester.

7.2 Second year

All second- year students are normally expected to teach each semester one section of the Laboratory C1903/1904 which meets for three-hour sessions one night a week for the eleven middle weeks of the semester. They are responsible in this capacity for designing a syllabus for the lab, conducting all

lab sessions, supervising their assigned assistant TA, holding office hours fixed or by appointment, and providing evaluations of all student work, as well as a recommended final grade for each student. They are also expected to attend TA meetings and to participate in the collective activity of developing new laboratory exercises. They are required to arrange teaching evaluation forms, either electronic or on paper. (For grading responsibilities, see below.)

7.3 Third-year and beyond

Students in the third year and beyond are not required to provide further teaching assistance in the Department. If there is a need for additional TAs and advanced students wish to volunteer, they will receive additional compensation. Opportunities sometimes also arise outside the Department (e.g., at Barnard), although students should check with their advisor or DGS before taking on outside duties.

7.4 Alternative TA assignments

On occasion, there may be an opportunity for a TA to discharge his/her teaching responsibilities in another undergraduate class. In this case, the faculty member teaching the class and the TA are expected to meet prior to the semester to outline expectations, priorities and responsibilities. In these cases, the exact tasks may differ from the lab-TA's, but the weekly expectation of 10-12 hours per week will be the same.

The faculty instructor in these classes is acting directly as a teaching mentor for the student. Hence, in general it is expected that student duties might include: no more than an average of 3 hours/week sitting in on class and 2 hours/week grading; writing homeworks and quiz questions (in collaboration with the instructor); running help and/or recitation sessions; researching new course materials such as demonstrations and technology inclusion. (Note - this list is intended to be suggestive, not all-inclusive.)

Students can request to TA a particular course or work with a particular instructor. First- and second-year students should first talk to the head TA, and then approach the faculty instructor and advisor. Third-year and above students should bring this up concurrently with their advisor, the head TA, and the faculty instructor.

A student may also propose a non-traditional way to fulfill his/her teaching requirements by emailing the Director of Graduate Studies and his/her advisor with suggestions. These requests will be dealt with on a case-by-case basis and cannot be guaranteed to be fulfilled.

7.5 Head TA

Each year, one graduate student will be designated as the Head TA. This student is normally a third- or fourth-year student with teaching experience as the leader of a laboratory section. The Head TA is appointed by the Department Chair in consultation with the faculty members teaching the introductory courses, the faculty member assigned to oversee the Laboratory course, and the TAs themselves. Appointment will be made in May for a term beginning the following August. The Head TA will receive additional compensation. If (s)he must teach a lab course beyond the third year, compensation will be equal to the normal TA plus Head TA pay rate. The Head TA will receive additional compensation of \$600 per semester. If the Head TA is in the fourth year or above, he or she may be expected to teach as well. In this case the additional compensation will be \$1600 per semester.

The Head TA's responsibilities include organizing registered students into lab sections, monitoring the curriculum in each lab section, monitoring evaluation of undergraduate students in each

section and across sections, organizing grading duties (see below) and arranging and chairing regular teaching meetings of all of the lab instructors and assistant instructors. The Head TA is also responsible for training graduate students in the use of the observatory equipment and liaising with whomever is responsible for the observatory on matters of observatory use and security. The Head TA should report to the Department Chair any equipment that is in need of replacement or any new equipment that may be required. He/she is responsible for an annual budget of an amount to be set each summer by the Chair for the renewal and improvement of laboratory equipment and supplies.

7.6 Grading Responsibilities

The large size of the introductory undergraduate astronomy classes, coupled with the Department's exam style (long-answer problems) and the short deadlines for submitting grades makes it essential that graduate students assist in the grading of midterm and final exams for these courses. In order to avoid placing an undue burden on individual students (recognizing that it is exam time for them as well), the Department expects that students will contribute to grading exams throughout their first three years at Columbia; in addition, students beyond the third year who are teaching for extra compensation will also be considered part of the grading pool. Each student will be expected to grade an equal number of hours each year. The Head TA will maintain a roster of student graders and record the discharge of their duties so as to assure an even distribution of labor.

Grading of problem sets and quizzes for the undergraduate astronomy courses is normally done by undergraduate majors hired for the purpose. However, if a graduate student is a TA for a class they may be asked to help with grading as part of their normal duties (see section on "Alternative TA assignments"). Graduate students who wish to volunteer to undertake this extra grading on top of their lab TA responsibilities may be able to do so for additional compensation.

7.7 Tutoring

It is the Astronomy Department policy that graduate students may not provide paid tutoring for any student currently enrolled in a Columbia Astronomy course. Furthermore, graduate students may not provide paid tutoring in Pupin for any students, whether enrolled at Columbia or elsewhere.

7.8 Time-Off Policy for Doctoral Students on Appointment in the Sciences

For full-time doctoral students on twelve-month research and teaching appointments in the sciences and related fields, the period between the fall and spring semesters, as well as the summer months, are considered to be active time of research, research training, and teaching preparation rather than holidays.

However, in any given academic year, such students are entitled to two weeks** beyond the eleven (Morningside Campus) designated University/Federal holidays listed immediately below: For the Morningside Campus:

- New Year (2)
- Martin Luther King, Jr. Day (1)
- Memorial Day (1)
- Independence Day (1)

- Labor Day (1)
- Election Day (1)
- Thanksgiving (2)
- Christmas (2)

**A week is defined by the number of days in a given calendar week that students are expected to be available to discharge their responsibilities.

Time off during the designated University/Federal holidays listed above is non-negotiable. Doctoral students who plan to take time off at other times may do so only after coordinating with a) their advisor or PI when holding a research appointment; and/or b) the faculty instructor or lead course coordinator when holding a teaching appointment. This will ensure that the requested time off does not conflict with the responsibilities attendant to the research enterprise or the course.

8 Travel Policy

Students who must travel for their research can use the credit card in the Astrophysics office to purchase plane tickets. Students can get a travel advance of \$300/\$500 for domestic/international conferences. See our Department Administrator (Millie Garcia) for details.

During their first two years at Columbia, students have generally yet to decide on a dissertation topic and individual faculty sponsor. As a consequence, they have no obvious place to turn for financial support if they wish to attend a conference or workshop. Even students with a dissertation sponsor may not find funds readily available when they wish to attend a meeting or go on an observing trip. Recognizing these realities, the Department has established a policy (consistent with its very limited resources) to provide some support for all students for professional travel:

– During their graduate careers at Columbia, each student will be allocated at least \$1500 from Department funds for travel related to their professional development. Most students will use this during their first two years, but this is not required. The funds may be expended only for acceptable charges filed within one month of a trip on a Columbia Travel Expense Report, including all necessary receipts. Charges in excess of the cumulative total of \$1500 will require prior approval; the Departmental Administrator will maintain a running total of each student's expenses that should be consulted by the student before making travel plans. In addition, students should check with the Director of Graduate Studies that a proposed trip is appropriately related to their professional development.

– Students who have exhausted their Departmental travel allocation and who have no other source of funds to travel professionally may petition the Department Chair for support. However, given the constraints on Department funds, it is not likely that it will be possible to support many such requests. Applications for such additional support which come with matching funds from other sources will be given priority. In the past, there has been some confusion as to what travel expenses are legitimate to claim on a travel expense report, independent of the source of funds. There are a significant number of government and University rules that must be adhered to in order for reimbursements to be processed. The Columbia rules are stated on the back of the form which should be consulted before a trip in order to avoid problems. In the interest of equity, we promulgate an additional set of guidelines. While it is not possible to impose these on individual grant Principal Investigators, they are consistent with University and Federal policies and should guide

students in making travel plans and incurring expenses. These policies will be imposed on trips reimbursed with Departmental funds:

- Tickets: These should be purchased far in advance in order to obtain the lowest possible fares. Only coach tickets are reimbursable. If support is being obtained from a government grant, air transportation must be on American flag carriers; travel reimbursed by the Department can be on any airline that minimizes the cost.
- Ground transportation: In general, rental car costs will not be reimbursed unless a) it can be demonstrated that this will incur a lower total cost than the standard alternative, and b) explicit approval is obtained in advance.
- Transportation to and from NYC airports by public transportation is strongly encouraged. Attempts should be made to share the cost among several students if a group is going to a meeting or on an observing trip. Transportation from the destination airport should be by public transportation if at all possible; again, sharing of cabs when they are required is strongly encouraged.
- Meals: Reimbursement for meals will always be the smaller of actual out-of-pocket costs or \$30 per day. Receipts for meals are now required under University policy; alcohol must be reported as a segregated expense and cannot be charged to government grants. An exception to the meal expense cap may be made, if prior approval is obtained, to cover the cost of a conference banquet.
- Registration Fees: Approved conference registration fees are reimbursed for registration at the lowest available rate; this usually requires registering far in advance of the meeting.
- Hotel: The lowest cost officially sanctioned housing should be used. Graduate students are expected to share double rooms if possible; most large meetings have mechanisms for facilitating sharing if you don't already have a roommate. Staying with a friend or relative is encouraged, although it is not reimbursed. However, it may provide justification for a rental car if this provides a net savings.
- In general, no other travel costs are reimbursable (e.g., phone calls, in-room movies, etc.). Prior approval should be obtained if other costs are anticipated.
- \$150 is allotted for poster-printing.

9 Other Administrative Procedures

By virtue of their participation in the research life of the Department, Astronomy graduate students will become involved with two separate administrative entities: the Department of Astronomy (office 1328 Pupin) and the Columbia Astrophysics Laboratory (office 1027 Pupin). For all academic matters (registration procedures, degree filing deadlines, teaching compensation issues) as well as housing, health care, and other issues related to benefits, the Astronomy Departmental Administrator is the person to whom one should turn. For travel reimbursement and other research-related issues supported by a federal grant, the Astrophysics Laboratory office is the place to go (if using a Department travel grant, travel expense reports in strict conformance with the above guidelines should be submitted to the Astronomy office).

The division between research-related activities and all other needs extends to other areas. For example, when photocopying a significant number (> 30) pages of research-related material, the tenth floor machine should be used, while all copying related to courses (either taken or taught) should be done on the thirteenth floor. Needless to say, all photocopying on either machine that is personal should be paid for at the rate of \$0.05 per page. Likewise, all personal long-distance phone calls made from any phone in the Department or the Laboratory should be reported at the time in a written note to the appropriate office, which will seek reimbursement when the bills are processed. Research-related long-distance calls should be reported to the student's research supervisor. Office supplies should be taken and used only for professional purposes and should be acquired from the appropriate office if the quantity is significant.

Any questions concerning such administrative matters should be directed to either of the Departmental Administrators.

10 Graduate Student Representation in Department and University Affairs

The following positions should be filled by a current graduate student in good standing to assure that graduate student views are represented in the appropriate fora.

10.1 Graduate Student Advisory Council (GSAC) representative

Currently, the GSAC is the student voice in governance of the Graduate School of Arts and Sciences (GSAS). The Council meets regularly with the GSAS Dean and other GSAS officers to provide advice on GSAS policy and raise issues of common concern. Each September, the Astronomy Graduate Students should elect a GSAC representative for a one-year, renewable term. The elected representative must agree to attend the monthly GSAC meetings and take an active role in the Council. The GSAC representative's name and electronic address should be communicated to the Graduate School as soon as it is determined.

10.2 Graduate Student Representative

Each summer, the graduate students will elect a Graduate Student Representative (GSR). The GSR is intended to act as an advocate for all graduate students in the Department. They will meet regularly with the DGS and be the person through whom the DGS can communicate broad issues to graduate students as a whole. The GSR should be knowledgeable about Departmental and University resources, lend an ear to the concerns of other graduate students, and arrange monthly meetings during which any student can communicate his or her opinion on a range of topics. Students who come to the GSR in his/her official capacity can expect privacy to be respected. The GSR will communicate to the faculty on behalf of another student when asked. Finally, the GSR must be a different person from the Faculty Meeting Representative (see below).

10.3 Faculty Meeting Representative

At most faculty meetings, and for most of the business of each meeting, a senior graduate student is invited by the Department Chair in consultation with faculty to present student views as appropriate, and to deliberate with the faculty on issues relevant to the Department's operation. The Faculty Meeting Representative will usually be asked to leave the room during any discussions of individual students. In order to assure an open exchange of views at the meetings, the details of

meeting discussions are confidential, although the substance of issues discussed and decisions taken should be communicated to the graduate student population. Thus, discretion is a key attribute required in this position. Normally, the graduate student representative will be at least a third-year student. The Faculty Meeting Representative cannot be the same person as the Graduate Student Representative (see above).

10.4 Graduate Admissions Committee Representative

Each year, the faculty member chairing the Graduate Admissions Committee will seek an interested student to serve along with four faculty on the Committee. This role requires reading $\sim 70 - 85$ application folders and taking part in several meetings to rank candidates and make admissions decisions. In addition, the Admissions Committee student representative should help organize the visits of prospective students; he/she may want to recruit one or two other students to assist with this job. Most of the effort for this task falls between January 25 and April 1. Appointments are for one year and are renewable.

10.5 Faculty Search Committee Representative

During years in which a faculty search is conducted, a graduate student representative to the search committee should be selected by the students in consultation with the Department Chair and the Chair of the Search Committee. He/she will meet with the Search Committee at their invitation. The representative's principal role will be to organize student interaction with short-listed candidates during their visits, and to communicate student evaluations of the candidates to the Search Committee and the Faculty.

11 Grievance Procedures

It is our goal to strive to maintain an environment in which students feel free at any time to discuss issues and concerns with any member of the Faculty. However, it is recognized that in some circumstances, more formal approaches may be desirable.

Within the Department, the Director of Graduate Studies (DGS) is the primary contact for all graduate students. He/she organizes the periodic meetings of students with their faculty research project advisors or dissertation committees, advises on course and research topic selection, and communicates to students evaluations of their research performance. For most issues, the DGS is the first person to turn to for advice and is the person with whom students should raise concerns. If for some reason this is unsatisfactory, the student should seek a meeting with the either the Graduate Student Representative or Department Chair, whomever they are comfortable with.

In some circumstances, a student may feel he or she would like to speak to someone outside of the Department. The University has several offices designed to facilitate such communications:

- The Dean of the Graduate School and his/her staff (typically the Associate Deans) are available for students seeking advice or to air complaints not satisfactorily addressed within the Department. (<http://www.columbia.edu/cu/gsas/dean.html>)

- The Ombuds Officer is a neutral complaint-handler serving all four campuses: Morningside, Health Sciences, Lamont, and Nevis. He/she seeks fair and equitable solutions to problems which might arise. The Ombuds Office is available to the entire Columbia University community, including students, faculty and staff. In considering any given instance or concern, the rights of all parties

who may be involved, along with the welfare of the University, are taken into account.
(<http://www.columbia.edu/cu/ombuds>)

– The Counseling and Psychological Service is available to all undergraduate and graduate students who are under the Health Service plan. A dedicated and experienced professional staff of psychologists, psychiatrists, and social workers; along with postdoctoral fellows in clinical psychology, and psychiatric residents is available to discuss, in confidence, a wide variety of concerns about oneself or others.

(<http://www.health.columbia.edu/cps/index.html>)

– The Office of Equal Opportunity and Affirmative Action administers the University's non-discrimination policies as well as policies on sexual harassment.

(<http://www.columbia.edu/cu/vpaa/eoaa/>)

12 Special Needs

At some point in their career, graduate students may find themselves in special circumstances. This section is intended to outline a few options that students may need to call upon.

– Taking a Leave of Absence: Students may take a leave of absence for medical, personal, or military reasons. More information on how to do this, how it affects immigration status and funding, and how to get reinstated, is available on the GSAS website.

(<http://www.columbia.edu/cu/gsas/sub/bulletin/policies/requirements/registration.html>)

– Accommodation for Parental Responsibilities: students may suspend responsibilities associated with the program for twelve weeks in order to attend to responsibilities associated with childbirth and adoption (as defined by GSAS); longer leaves should be discussed in advance if possible. Teaching responsibilities may be suspended for an entire semester.

(<https://gsas.columbia.edu/graduate-life/student-life-well-being/parental-accommodation>)

– Transferring within GSAS: A student may find that they desire to transfer between departments within the Graduate School of Arts and Sciences. They should make contact with the desired Department Chair to be sure that they have the permission and funding to change Departments. The transfer cannot take place or be requested in the first semester of a student's attendance at GSAS.

(<http://www.columbia.edu/cu/gsas/sub/bulletin/policies/cod/index.html>)

13 Departmental Activities

The Department has a regular schedule of activities in which graduate student involvement is strongly encouraged. Briefly, these include:

Colloquia: Once per week during the academic terms, the Department sponsors a Colloquium, usually by a visiting scientist, on Wednesday afternoon. As these reports on current research in our field are an integral part of a graduate education, graduate student attendance is expected. The Department normally hosts a lunch for students only with the speaker each week (at a local

restaurant or with order-in food in the library); one student must pay each week and present the receipt for reimbursement to the Department office. Physics Colloquia on Monday afternoons are also frequently on topics of interest and attendance is encouraged.

Pizza Lunch: Once a week, currently on Tuesdays, we meet to talk informally about our own research over lunch. Students are strongly encouraged to attend and to participate.

Journal Club: Some years students and faculty organize a (bi) weekly journal club. Several Department members, usually 2 or 3, discuss a recent interesting paper of their choice.

Astrofest: As noted above, one Friday in September is set aside for this annual gathering of the Department in which all students, faculty, and post docs present brief (5-minute) research reports. All students are expected to participate; typically, the incoming third-year class organizes the event. Astrofeast (following Astrofest) is optional (but usually tasty).

Bishop Lecture: The Department has one endowed lectureship each year, the Jeffrey Bishop Lecture, named in honor of a popular Department lecturer who was tragically killed in a jogging accident. The event consists of a colloquium followed by a reception and a Department-wide dinner. Participation by all students is strongly encouraged.

Public Outreach: The Department runs a variety of public outreach activities including family days (and nights), lectures, and star-gazing from the roof (and, on special occasions such as cometary apparitions, etc., from other City locations). Students interested in participating in these important public activities are encouraged to do so; in many cases, remuneration in the form of additional compensation is available. Currently a network of volunteers, which is headed by the Outreach Director, organize regular events every two weeks. (See <https://docs.astro.columbia.edu/wiki/Outreach>)