Table of Contents

INTRODUCTION

The Mission of the graduate program in the Department of Physics at UB is to provide students with an outstanding education that consists of comprehensive and rigorous course work, and intensive independent research experience. Our goal is to train our students so that they have the tools to pursue careers that involve education and/or original research.

Our main degree program is the Doctor of Philosophy program. This program is for students who aim at pursuing careers in higher education, scientific research, industrial research, or governmental services. A Ph.D. recipient is expected to have (a) comprehensive understanding of basic principles of physics; (b) advanced knowledge in a specialty area; (c) broad knowledge of physics topics outside the specialty area; (d) in-depth scientific research skills; and (e) teaching and communication skills.

We also have a Master of Science program, which consists of three tracks: the thesis option, the project option, and the Qualifying Exam option. In addition, we offer an Advanced Graduate Certificate in Computational Science, and are part of the program leading to an Advanced Graduate Certificate in Professional Science Management. These certificates provide students with important skills and knowledge for professional development in and beyond the academic environment.

The Department of Physics Information Handbook is intended primarily as a source of information for all graduate students majoring in the Department of Physics. It explains the general regulations of the Department pertaining to degree requirements and gives a brief introduction to the policies of the Department.

The regulations and procedures are those in effect at the time the handbook is published. The Department reserves the right to amend its regulations and procedures when necessary and grants students the right to petition in individual cases. The Department however, does not have the right to waive requirements set by the State University of New York or the Graduate School.

In addition to the Departmental requirements found herein, the Graduate School has its own requirements and policies contained in their publication "Graduate School Policies & Procedures; a Manual for Graduate Students and Advisors" available at their website: www.grad.buffalo.edu/policies/policies_procedures.pdf. Copies of this manual are available in the Physics Department main office. All students are strongly encouraged to obtain a copy, review it, and keep it with this handbook. The Graduate School Office is open from 8:30 a.m. to 5:00 p.m. Monday through Friday. Students are invited to call the Graduate School at 716-645-2939 for information or appointments.

The latest updated version of the Department of Physics Information Handbook is available online at: www.physics.buffalo.edu/graduate/handbook/studenthandbook.pdf If additional information is needed, please direct your inquiries to the Graduate Studies Secretary, the Physics Department Main Office staff, or to the Director of Graduate Studies. If you feel additional items of information should be included in the next publication of this Handbook, your suggestions and comments in writing will be greatly appreciated.

GRADUATE PROGRAMS

Our main degree program is the *Doctor of Philosophy* program. This program is for students who aim at pursuing careers in higher education, scientific research, or industrial research. We also have a *Master of Science* program, which consists of three tracks: the thesis option, the project option, and the Qualifying Exam option. In addition, we offer an Advanced Graduate Certificate in Computational Science, and are part of the program leading to an Advanced Graduate Certificate (Biophysics Track) in Professional Science Management. These certificates provide students with important skills and knowledge for professional development in and beyond the academic environment.

MASTER OF SCIENCE, THESIS OPTION

In addition to the general requirements of the Graduate School, the

Department requires:

1. A minimum of 30 credit hours of formal graduate course work and thesis research is required. The overall GPA must be a minimum of 3.0 (equivalent to a grade of "B") for all courses leading to the degree.

2. At least 18 credit hours of the student's complete program is to be devoted to formal graduate course work. Physics 551 or 552 (Graduate Lab) is required and is included in the 18 hours. Physics 598, 599, and all 600 level courses will not be counted toward the 18 hours.

3. Up to 12 credit hours of informal credits such as independent study, supervised teaching, or directed research (PHY 598, PHY 599, and PHY 600) to aid in the production of a final publication-ready thesis.

4. No more than six credit hours of course work may be transferred into the program. Only courses with a grade of "B" or better are eligible as transferable credit.

5. The student must pass a public oral defense of the thesis. The committee consists of the Major Professor who is a member of the Graduate School Faculty and holds the rank of Assistant Professor or above, and one other faculty member. The completed thesis must be submitted to the Department at least one week in advance of the date of defense.
6. An electronic copy of the thesis in the pdf format must be delivered to the Graduate Studies Secretary for repose in the Physics Department Library before the degree is conferred. Refer to the Degree Conferral Timetable for the dates when paperwork must be received by the Graduate School in order to graduate on time.

Please refer to the Graduate School Manual website www.grad.buffalo.edu/policies/policies_procedures.pdf for a complete disclosure of all Master's degree requirements.

MASTER OF SCIENCE, PROJECT OPTION

1. A minimum of 30 credit hours of formal graduate course work and project research is required. The student's overall GPA must be a minimum of 3.0 (equivalent to a grade of "B") for all courses leading to the degree.

2. 24 credits of formal course work consisting of:

   - 12 credit hours - 507, 509, 513, 519, and 3 credit hours of 551 or 552 (Graduate Laboratory). The grades in three out of these five courses must be "B" or better.
   - 9 credit hours - courses exclusive of Physics 598, 599, and all 600 level courses.

3. 6 credit hours of PHY 600, which would terminate in a report approved by the student's research supervisor and one other graduate faculty member.

4. No more than six credit hours of course work may be transferred into the program. Only courses with a grade of "B" or better are eligible as transferable credit.

5. The student will write a project report, which will be reviewed by the Major Professor who is a member of the Graduate School Faculty and holds the rank of Assistant Professor or above, and possibly one other faculty member.

Please refer to the Graduate School website: www.grad.buffalo.edu/policies/policies_procedures.pdf for a complete disclosure of all Master's degree requirements.

MASTER OF SCIENCE, QUALIFYING EXAM OPTION

1. A minimum of 30 credit hours of formal graduate course work is required, consisting of:

   - Required Coursework:
     21 credit hours: PHY 507, PHY 508 (*Quantum Mechanics 1 and 2 – 6 cr.*), PHY 509 (*Dynamics – 3 cr.*), PHY 513, PHY 514 (*Electrodynamics 1 and 2 – 6 cr.*), PHY 519 *(Thermal-statistical Physics 1 – 3 cr.)*, PHY 551 or 552 (*Graduate Laboratory – 3 cr.*). The grades in four out of these seven courses must be "B" or better.

   - Elective Coursework:
     9 credit hours – any graduate physics courses exclusive of: PHY 598, 599, and all 600 level courses.

2. The student's overall GPA must be a minimum of 3.0 (equivalent to a grade of "B") for all courses leading to the degree.

3. The student must pass the Qualifying Exam at the M.S. level within 18 months of his/her initial registration. Specifically, a student with a total score of 80 (out of 200) or more on the whole exam passes the Qualifying Exam at the Master of Science level. A more detailed description of the Physics Qualifying Exam is given in the section on the Ph.D. degree.

4. No more than six credit hours of course work may be transferred into the program. Only courses with a grade of "B" or better are eligible as transferable credit.

ADVANCED GRADUATE CERTIFICATE IN PROFESSIONAL SCIENCE MANAGEMENT (PSM)

This certificate aims to meet the needs of employers by providing them with science-trained professionals who possess science/mathematics knowledge as well as business fundamentals. With a PSM certificate, you can acquire these desired work skills and gain an advantage in today's increasingly competitive job

market.

The name "Professional Science" refers to the post-graduate opportunities for students who wish to pursue non-academic careers in science within business, government, or non-governmental organizations. The PSM Certificate program is centered in the activities of the College of Arts and Sciences. Considerable breadth is assured since this program will be a cooperative venture between a number of academic departments including Biological Sciences, Chemistry, Geography, Geology, Mathematics, and Physics. The Certificate program will be open to candidates for the Master's degree in Physics, Chemistry, Geography, Geology, Mathematics, and Natural Science Interdisciplinary, or to those already holding a baccalaureate degree in a participating science department.

The Department of Physics offers a Biophysics track in PSM. Graduate students are eligible to participate in this program. Students will receive two credentials upon graduation, a graduate degree in Physics and a PSM certificate. For more information about the PSM program, please visit: www.professionalmasters.cas.buffalo.edu/, or contact the Graduate Studies Secretary, Physics Department Office.

ADVANCED GRADUATE CERTIFICATE IN COMPUTATIONAL SCIENCE

An advanced certificate program in computational science designed to train science and engineering graduate students is approved by the New York State Education Department and the Chancellor of the State University of New York. This certificate provides students with a credential certifying that they have obtained educational training targeted at the specific area of computational science.

Curriculum

Requirements for the Advanced Certificate consist of:

1. Acceptance into the graduate or combined BA-MA degree program of a participating Department.

2. Completion of 15 hours of coursework, including:
   - 6 credit hours consisting of the required courses PHY 515, "High Performance Computing I" and PHY 516, "High Performance Computing II";
   - 9 credit hours of elective coursework consisting of Departmentally approved courses as detailed below.

Students must maintain a "B" average in all Certificate courses and must be in good academic standing in their home department.

The courses High Performance Computing I and II (HPC I and II serve to educate students in the methods of scientific computing on modern hardware architectures.

In addition to High Performance Computing I and II, students must take three courses from among PHY 501, Mathematical Physics PHY 505 and 506, Computational Physics I and II, PHY 507 and 508, Quantum Mechanics I and II, PHY 509, Classical Dynamics PHY 513 and 514, Electrodynamics I and II, and PHY 519 and 520, Statistical Mechanics I and II. Students may request a waiver to allow a substitution for these requirements, but any substitution requires prior approval of the Director of Graduate Studies in consultation with the Director of the Center for Computational Research (CCR).

Participating departments, in consultation with the Director of CCR, will approve the awarding of the Advanced Certificate for students registered in that department.

DOCTOR OF PHILOSOPHY

A minimum of 72 credit hours of graduate study and thesis research is required for a Ph.D. degree.

Preparation level upon entering the Ph.D. program

When a student first enters the Ph.D. program, he/she should have taken undergraduate courses on all the basic subjects of physics as listed below, at the level illustrated by the listed textbooks. If a student has deficiency in one (or more) of these subjects, a remedial course (or courses) should be taken. This decision should be made by the student and his/her academic adviser.

1. *Undergraduate Classical Mechanics*
   a. Mechanics, by K. Symon;
   b. Analytical Mechanics, by G. R. Fowles.

2. *Undergraduate Electricity and Magnetism*
   a. Foundations of Electromagnetic Theory, by Reitz Milford and Christy;
   b. Electromagnetic Fields and Waves, by Lorrain, Corson, and Lorrain;
   c. Electromagnetic Fields, by R. K. Wangsness.

3. *Undergraduate Thermodynamics and Statistical Mechanics*
   a. Statistical and Thermal Physics, by F. Reif;
   b. Thermal Physics, by C. Kittel and H. Kroemer.

4. *Undergraduate Atomic and Quantum Physics*
   a. Quantum Mechanics, by Bransden and Joachain;
   b. Introductory Quantum Mechanics, by Liboff;
   c. Quantum Physics, by S. Gasiorowicz.

Graduate Course Requirement

1. A minimum of 36 credit hours must be earned in formal graduate courses approved by the Physics Department. Courses in Physics 598, 599, and all 600 level courses do not count toward this 36 hour requirement. The overall GPA must be a minimum of 3.0 (equivalent to a grade of "B") for all courses leading to the degree.

   All Ph.D. candidates must take and pass with an average grade equivalent to "B" or better, the following graduate courses:

Graduate Core Courses

- Classical Dynamics (PHY 509)
- Electrodynamics I and II (PHY 513, 514)
- Quantum Mechanics I and II (PHY 507, 508)
- Statistical Mechanics (PHY 519)
- Graduate Lab (PHY 551 or 552)

Of the remaining 15 required credits only graduate leve courses can be taken. The following is required:

- Colloquium 602B in the 1st academic year, and 602A in the 2nd academic year

PHY 503 and 504, as well as any undergraduate courses taker for graduate credits are excluded. It should be emphasized tha students who must take remedial or undergraduate course during the first two semesters will take more than two years t complete their course work.

2. Graduate courses offered by other Departments can be taker only if the student's advisor approves. The following i required by the UB Graduate School:

   - Research Ethics course for those entering UB in and after Fall 2009.

3. Graduate students who have taken equivalent course elsewhere can petition the Graduate Studies Committee t approve transfer of credit for these courses. No more than 1 credits of course work may be transferred into the program Only courses with a grade of "B" or better are eligible a transferable credit.
4. All Ph.D. students whose native language is not English an who do not have a previous degree from an English speakin institution, must pass the SPEAK Test in order to receive thei Ph.D. English courses such as ESL512 do not count towar the 72 credits required for the Ph.D. degree.

Qualifying Exam

Within 18 months (three semesters) of enrollment as a full-time graduate student, a student is required to pass the Qualifying Examination. A maximum of two attempts at this exam is permitted except a free trial upon initial enrollment in the Department (see "Regulations Concerning Qualifying Examination for Degrees in Physics", later in this handbook).

Thesis Committee Composition

Major Professor and a Ph.D. committee must be chosen no later than 24 months after enrollment in the graduate program by filing the Thesis Advisor form. The Major Professor (or one of the co-Major Professors) must be a regular faculty member in the Physics Department. The Major Professor must also be a member of the Graduate School Faculty who holds the rank of Assistant Professor or above. Failure to choose an advisor may result in losing Departmental financial support. The Committee consists of two or more faculty members (in addition to the Major Professor), chosen by the student with the approval of the Graduate Studies Committee. All committee members should be active in research during the last five years. At least one of them should work in the same general area if possible. Faculty from other departments of UB can serve on the committee (see Appendix B). The same criteria apply for the selection of committee members outside the Physics Department i.e. they must be active in research during the last five years.

Thesis Topic Defense

Students are required to present their Thesis Topic Defense as soon as possible after they have chosen an advisor and a committee. Under normal circumstances the Thesis Topic Defense should be passed no later than 36 months after enrollment in the graduate program. In exceptional circumstances where there is a change in advisor the Graduate Studies Committee will set a new time limit for defense. Failure to meet the schedule may result in the student being considered not in good academic standing.

The presentation will have the format of a 30-45 minute seminar in front of the Ph.D. committee. In the presentation a review of the relevant literature is given and the proposed work is discussed This presentation is open to the public. A summary of the presentation must be given to the committee members two weeks before the Thesis Topic Defense. On the basis of the presentation the committee evaluates the candidate's level of understanding o the proposed topic. If the proposal is not approved, the committee will advise the student on possible courses of action.

Dissertation and Degree Conferral

The completed dissertation must be submitted for review by the committee members at least two weeks in advance of the date o defense and will be accepted only if it is judged to be publishable in a refereed scientific journal. In addition to the requirements o the Graduate School, the Department requires a bound copy which must be received by the Graduate Studies Secretary in care of the Department Library before the degree is conferred. Please refer to the Graduate School Manual at www.grad.buffalo.edu/policies/policies_procedures.pdf for a complete disclosure of the doctoral degree requirements. Refer to "Degree Conferral Timetable" for the dates when paperwork mus be received by the Graduate School in order to graduate on time.

APPLICATION TO CANDIDACY

The Application to Candidacy is a document that includes a summary of courses to be applied toward a degree. The filing o this application with the Graduate School indicates that the studen is entering the final stages of degree completion. Normally students should expect to file an Application to Candidacy afte three semesters of full-time enrollment toward the Master's degree or after six semesters of full-time enrollment for the Doctora degree. Primary responsibility for evaluation of a student's program shall rest with the student's Masters or Ph.D. committee Students should refer to the Degree Conferral Timetable below fo requirements particular to each of the three degree dates. Once admitted to candidacy, a student need not enroll for 12 credits (9 credits for graduate, teaching and research assistants) to be

certified as full-time for tuition scholarship or student loan purposes. Application to Candidacy forms are available from the Graduate Studies Secretary, Physics Department Office.

COURSE SELECTION FORM

Each student, in consultation with his/her advisor, must complete a Course Selection Form available from the Graduate Studies Secretary, Physics Department Office and return it to the Director of Graduate Studies prior to registering for classes each semester until an Application to Candidacy form has been submitted.

- A graduate student advisor will be assigned to each graduate student. The advisor will be a member of the Graduate Studies Committee who will continue as such until the student selects a thesis advisor.
- Students who do not follow a course of study approved by their advisor will not be in good academic standing within the Department and are responsible for payment of tuition for the non-approved course(s).
- If there are course changes after the form has been submitted, the form must be suitably amended and signed.
- If a student is unable to come to an agreement on an approved course of study with the advisor the student may contact the Director of Graduate Studies.

TIME LIMIT FOR DEGREE CONFERRAL

Graduate School regulations impose limits on the time to be spent pursuing an advanced degree. Within the College of Arts and Sciences, a maximum of seven years is allowed to study toward a Ph.D. degree and four years is the maximum for a Master's.

In special cases, students may petition the Graduate School through the Graduate Studies Committee to have these limits extended.

DEGREE CONFERRAL TIMETABLE

FOR DEGREE CONFERRAL ON	FEB 1	JUN 1	SEP 1
Graduate School receives Application to Candidacy with Dean and Divisional Committee approval by ...	October 1	March 1	July 1
ALL required materials (including the m-form) are received in the Graduate School by ...	Friday before Spring classes begin	Day after last day of Spring exams	Friday before Fall classes begin

The above dates are subject to change. You are advised to check with the Graduate Studies Secretary one semester prior to the deadline date listed for up-to-date information.

It is the student's responsibility to check with the Graduate School 716-645-2939 and the Student Response Center 716-645-2450 prior to the deadline dates to be sure all the requirements and paperwork for your degree have been completed. The Application to Candidacy and all relevant forms and additional instructions can be obtained from the Graduate Studies Secretary, Physics Department Office.

INFORMAL COURSES

Informal courses include projects, theses, dissertations, directed readings, directed research, and independent study. In the Physics Department, our informal courses are: PHY 598, "Independent Study"; PHY 599, "Supervised Teaching"; and PHY 600 "Graduate Research".

The following rules are in effect: for informal courses, other than thesis, dissertation or project, for which there is no description in the official university publications, a statement of the proposed activity and its relevance to the student's educational goal and degree program should be filed with the student's record and reflected in his/her Application to Candidacy. These statements become a part of the student's academic record and will be used by the Divisional or Area Committees and the Graduate School in

questionable cases to form their recommendations concerning the student's program. It is the responsibility of the student, the instructor, and the advisor, in that order, to see that the statement is filed at the appropriate time. Failure to do so will delay and may interrupt appropriate responses of committees and individuals responsible for processing degree credentials. The "Informal Course Description" form is available from the Graduate Studies Secretary, Physics Department Office.

SEMINARS AND COLLOQUIA

First-year graduate students in the Ph.D. program are required to register in PHY 602B for the full year. Each week a faculty member will describe his/her research program. This course is designed to help new students choose a thesis advisor.

Second-year Ph.D. graduate students are required to register in PHY602A (Physics Colloquium) for the full year. Colloquia expose students to distinguished external speakers, and new developments in physics. Graduate students are also encouraged to attend physics seminars.

MONITORING STUDENT PROGRESS

The following policies will apply:

1. Each semester the modified GPA is calculated. The modified GPA is calculated by averaging all courses excluding PHY 598, 599, 600, and 602, and English Language Institute courses. Students failing to make at least a "B" average will receive a notice that they have been placed on Academic Probation.

2. Any student failing to attain a modified GPA of "B" for two consecutive semesters may have his/her graduate registration in the Physics Department terminated.

3. The Graduate Studies Committee is empowered to conside any petition for special consideration concerning the application of Rule 2.

4. Early career students (those who have not joined a researcl group) are expected to have regularly meetings with thei assigned academic advisers to discuss their progress anc their short-term goals. Students who have researcl advisers are expected to meet with their advisers regularly to discuss their progress toward their degree requirements and are required to file an annual progress report to the graduate secretary (typically after the end of the spring semester).

5. Any student violating standards of academic integrity may have his/her graduate registration in the Physics Department terminated.

REGULATIONS CONCERNING QUALIFYING EXAMINATION FOR DEGREES IN PHYSICS

The Qualifying Examination is an exam that a student must pass to continue for the Ph.D. degree. It can also act as an option fo obtaining an M.S. degree. If a new student is prepared, he/she can take a "free trial" of the Qualifying Exam upon entrance to the Graduate Program. The students can take the Qualifying Exan two more times if necessary but are expected to pass it within 18 months (three semesters) of entering the Department. No furthe attempts are allowed. The Qualifying Exam is given each year a the beginning of the Fall and Spring semesters.

Graduate students who have exhausted their trials and/or have exceeded the time limit must petition the Graduate Studies Committee to be granted an extra trial:

- The petition must be filed by March 15th for the Qualifying Exam given in August, and October 15th for the Qualifying Exam given in January.

The petition must include:

- why the student failed in the previous attempts;
- what is going to be different in the next try if approved

Part-time students who need additional time for the three attempts may also petition the Graduate Studies Committee for extension of the 18 month limit.

The Qualifying Exam is an eight hour written exam on graduate level dynamics, classical electrodynamics, and quantum mechanics. The graduate level problems are based on material covered during first semester in our Department in PHY 509, PHY 513, and PHY 507. Both the first and second sessions (each of four-hour duration) will cover problems on all three subjects.

The Qualifying Exam is designed to be completed in three hours but ample time will be given (four hours) to the students so that they do not feel time pressure. Students with special needs should contact the Director of Graduate Studies in advance of the exam to schedule more time or make other special arrangements if necessary.

The format of the Qualifying Exam is detailed below to help students prepare for it. Copies of previous examinations are available from the Graduate Studies Secretary, Physics Department Office. The textbooks listed below are not "prescribed"; problems need not be chosen solely from them. Rather, these books represent the range and level of topics that the student is expected to have mastered. Other comparable textbooks may be used for study. The Qualifying Exam tests materials normally taught in PHY 507, 509, and 513. Since the actual topics covered in these courses may vary from year to year, the required topics for the Exam are listed below.

Session A [Choose 2 problems from A and 2 from B]

A. *Graduate Classical Dynamics (4 problems)*
Topics: motion of particles and rigid bodies, Langrange's and Hamilton's equations, canonical transformations, action angle variables, small oscillations. Classical Mechanics, by

H. Goldstein; Mechanics, by L. D Landau and E. M Lifshitz.

B. *Graduate Electrodynamics (4 problems)*
Topics: electrostatics of conductors and dielectrics magneto statics, currents in conductors, Maxwell's equations, plane waves, waves in waveguides. Classica Electrodynamics, by J. D. Jackson, Classical Electricity and Magnetism, by W.K.H. Panofsky and M. Phillips.

Session B [Choose 4 problems from C]

C. *Graduate Quantum Mechanics (6 problems)*
Topics: bound states, potential scattering, operato equations, angular momentum, and approximation method for stationary states. Quantum Mechanics, by G. Baym; Quantum Mechanics by A. Messiah; Quantun Mechanics - Non-relativistic Theory, by D. L. Landau and E. M. Lifshitz; Modern Quantum Mechanics, by J. J Sakurai.

Criteria for Passing the Qualifying Exam at the PhD level

1. Students with a total score of 50% or more on the whole exam.

2. A score of 30% or more in each of the three subject areas namely Classical Dynamics, Electrodynamics, and Quantun Mechanics, will pass the Qualifying Exam.

3. Students for whom this is not the last chance, i.e., who have no exhausted the allowed number of trials or exceeded the time limit, and who have a score of 50% or more on the total, bu less than 30% in any of the three subject areas, namely Classical Dynamics, Electrodynamics, Quantum Mechanics will fail the Exam.

Students for whom this is their last chance, i.e. who have eithe exhausted their allowed number of trials and/or exceeded the time limit, and who have a score of 50% or more on the total, but less than 30% in one or more of the three subject areas, namely Classical Dynamics, Electrodynamics, and Quantum Mechanics

will be given orals by the Graduate Studies Committee in those subject areas in which they score less than 30%.

Procedure for Regrading Qualifying Examination

Regrading is allowed within one week after the results are announced. Regrading will be strictly anonymous. This will be accomplished as follows:

1. During the faculty meeting to decide the results of the exam, the student names are not announced. Only the Department Chair and the Graduate Studies Secretary have the list. The results are announced using the exam codes.

2. Regrading is handled by the Qualifying Exam Administering Subcommittee, who will contact the faculty member. If, after regrading, a student still has questions about the regrade, the student will contact the Department Chair.

3. Faculty names do not appear on the problem envelopes or the problem solutions. If a student tries to contact a faculty member about regrading in any way, that faculty member notifies the Qualifying Exam Administering Subcommittee. As a result, regrading of all the problems for that particular student stops.

4. Student names are announced after regrading is completed.

ASSISTANTSHIPS

In the Physics Department, the job duty of a Teaching Assistant (TA) includes either recitation sessions for lecture courses or laboratory sessions, and often exam grading duties. Specifically, TAs have regular recitation/laboratory sessions, regular office hours during academic years (during reading days and exam periods, TAs should arrange office hours with their students based on need), regular TA meetings with lecture/lab supervisors, and other preparations.

It is the policy of the Department to use assistantships for suppor of meritorious students who wish to pursue graduate studies i Physics toward a higher degree. Assistant and Fellowshi appointments are awarded on the basis of academi accomplishments and potential. Appointments are intended t assist students in acquiring the skills and understanding they wil need in order to complete the requirements of their graduate degre programs. There are more graduate students registered in th Department than there are teaching assistantships. For this reaso the selection of students for the positions has to be made on competitive basis, by the Graduate Studies Committee, accordin to criteria set forth below:

Teaching Assistantship appointments are normally made for on academic year at a time. Foreign-language-speaking teachin assistants must pass the SPEAK Test upon arrival in th Department. Failure to be certified to teach by the Englis Language Institute will result in appointment as a Graduat Assistant at a reduced stipend. Students in this category must pas the SPEAK Test within two semesters to be considered for renewa of their Teaching Assistantship position (see Appendix D). I order to qualify for renewal, a student must show satisfactor progress toward a degree.

A student who does not satisfy the criteria listed below may not have his/her assistantship renewed:

1. An assistant is expected to perform his/her teaching dutie diligently and effectively as reflected by the supervisor' grade (PHY 599). Less than a "B" grade in PHY 59 results in an automatic reassignment to a differen instructor. A second semester with less than a "B" grad results in an automatic standby status for Teachin Assistantship.

2. A Ph.D. student is expected to pass the Qualifying Exan within the time schedule described earlier.

3. A student is expected to maintain a modified GPA of "B or better, and in no two consecutive semesters shoul his/her modified GPA be below "B".

4. A student violating standards of integrity may have his/her teaching assistantship immediately revoked.

It is to be emphasized that these criteria are only the minimum requirements. Because of the limitation of the total number of available positions, meeting these conditions will not automatically guarantee a teaching assistantship.

In the case of a first-year graduate student who holds a teaching assistantship, the modified GPA requirement of "B" in the first semester may be relaxed. However, if the student does poorly, he/she may not be re-appointed for the second year. It should be noted that unfilled assistantships may occasionally be available as late as September. Those who are turned down and who do better in the second semester may wish to re-apply.

During the first 4 semesters that a student works as a Teaching Assistant, he/she will be automatically registered in PHY599, Supervised Teaching (1 credit per semester). These credits count toward the 72 credits required for a PhD degree.

If a student has a co-Major Advisor outside the department, the external Advisor is expected to provide financial support to the student.

Time Limits

A limit is set by the University and the Department on the number of years a student can hold a teaching assistantship. It is two years (four semesters) for a Master of Science candidate and five years (10 semesters) for a Ph.D. candidate. Other support may be available for students who have exceeded these limits.

In some instances, special conditions may exist which justify an exception. A student whose academic record indicates steady progress may request an extension of support if any one of the following applies:

1. the student changes his/her Major Professor;

2. the student contracts a serious illness or physical handicap;

3. the Major Professor is inaccessible to the student and there are documented efforts to secure a replacement;

4. the student's academic progress is delayed due to a variation in the direction of his/her original research or program of study;

5. Other compelling reasons which are documented.

The Graduate Studies Committee has the right to make exceptions to all or any of the above guidelines.

UNSUPPORTED STUDENTS

The unsupported students are encouraged to meet the minimum requirements for an assistantship including passing the SPEAK Test. (see Appendix D). The Department has no financial obligation to graduate students who choose to enter the graduate program initially unsupported.

TUITION SCHOLARSHIPS

Graduate Students Appointed as Teaching, Graduate, or Research Assistants

Students appointed to an assistantship of at least 0.25 fulltime position are eligible for tuition scholarships during the fall and spring semesters of the academic year of their appointment.

Tuition scholarship funds may be applied only to academic year tuition costs; any graduate fees or summer tuition costs are not

covered by this scholarship. The tuition scholarship may be renewed to cover no more than the minimum credit hours required for a student's primary degree. Transfer credits are counted in the minimum credit hours toward the degree; tuition scholarships awarded at the Master's level are included in the Ph.D. scholarship totals. The complete Tuition Scholarship policies can be found at: www.grad.buffalo.edu/policies/tuition_scholarship_policy.

Definitions

The term "semester limit" applies to the number of semesters that have elapsed since admission into the University as a graduate student, *regardless of whether tuition scholarship support was received*, but not counting any semester in which the student was on an approved leave of absence.

The term "credit-hour limit" applies to the cumulative number of credit hours a student has registered for since admission into the University as a graduate student, *regardless of whether tuition scholarship support was received*, and including courses from which a student has resigned after the drop deadline.

Responsibility

It is a student's responsibility to initiate the application for tuition scholarship by contacting the Graduate Studies Secretary, Physics Department Office. New York State residents must file for the Tuition Assistance Program (TAP) if available for 2010-11. Neither the Department nor the Dean's Office is responsible for any late fees or loss of tuition scholarship resulting from the student's negligence or from any appointment which takes place after the tuition scholarship deadline.

Eligibility

Students eligible to apply for tuition scholarship include those in the following categories, *in order of priority*, who have not reached the time limit applicable for their degrees:

- Full-time matriculated graduate students in the College of Arts and Sciences, in good academic standing, and

supported by a semester-based fellowship or assistantship funded by the College of Arts and Sciences or by an external sponsor;
- Full-time matriculated graduate students in the College of Arts and Sciences, in good academic standing, and with demonstrated financial need (subject to availability of funds); and
- Full-time matriculated graduate students outside of the College of Arts and Sciences, in good academic standing, and supported by a semester-based assistantship funded by the College of Arts and Sciences (subject to availability of funds).

A student violating standards of academic integrity may have his or her eligibility for a tuition scholarship revoked.

Registration Restriction

The maximum number of credit hours supported by tuition scholarship in a semester is *nine*. Deviations from this limit may be approved by the Dean's Office, but only on a case-by-case basis upon recommendation by the Department for valid academic reasons, or through an explicit understanding between the Dean's Office and the Department on the use of a specific registration strategy designed to conserve tuition scholarships.

The tuition scholarship can be applied only to courses within a student's program of study approved by the Department before degree candidacy and by the Graduate School after degree candidacy. Courses outside of one's approved program of study and all undergraduate courses will not be supported unless specifically recommended by the Department and approved by the Dean's Office.

Time Limit for Tuition Scholarship

For a Master's student, the semester limit is *four,* and the credit hour limit is *30*. For a doctoral student, the semester limit is *eight* and the credit-hour limit is *72*. The time limit is reached when either the semester limit or the credit-hour limit is reached *whichever comes first.* Masters candidates seeking a fifth semeste

or beyond of tuition scholarship support and doctoral candidates seeking a ninth semester or beyond of tuition scholarship support must complete a "Tuition Scholarship Application for Waiver of Time Limit" which is available from the Graduate Studies Secretary, Physics Department Office. Students must justify why additional tuition scholarship support is needed. If approved by the Dean's Office and Graduate School, students will ordinarily be limited to only one credit hour of tuition scholarship per semester.

The above time-limit guidelines apply only to a student pursuing a single graduate degree at the University. A student pursuing more than one graduate degree at the University should refer to the section on Multiple Degrees.

Tuition Rate

For a student in the first two semesters of study at the University, the tuition per credit hour provided will be in accordance to the in-state or out-of-state classification of the student. US students and Permanent Residents who are not New York State residents must file for New York State residency during their first year at UB. If filing for residency would impose a serious hardship, students may petition the Dean of the College of Arts and Sciences for an exemption from this requirement.

International students are not eligible for New York State residency and therefore exempt from this requirement. Beginning with their third semester of study, eligible out-of-state residents who have not applied for New York State residency will be awarded tuition scholarships at the lower in-state tuition rate. These students are personally responsible for the difference between the in-state and out-of-state tuition charges. Those eligible to apply for financial aid under the New York State Tuition Assistance Program (TAP) must do so in a timely manner. Failure to apply for TAP, if eligible, will result in a reduction of tuition scholarship equivalent to the estimated amount of TAP award.

For a student enrolled in a program outside of the College of Arts and Sciences, the tuition per credit hour provided will be equal to

that appropriate for either the student's program or the College o Arts and Sciences, whichever is lower.

Multiple Degrees

A student pursuing more than one graduate degree at the University is subject to a *cumulative* time limit equivalent to tha of the *highest* degree pursued. This time limit is calculated from the time of the *initial admission* as a graduate student into the University. Any additional support beyond this time limit is purely discretionary, and will be considered for approval by the Dean's Office only under extraordinary circumstances, on a case-by-case basis, upon recommendation by the Department, and subject to the availability of funds.

Budget Constraints

The Dean's Office reserves the right to modify these guidelines in reaction to budget constraints

FULL-TIME STATUS

A full-time graduate student in the Department of Physics is one who carries 12 or more credit hours per semester. Students who hold Teaching, Graduate, or Research assistantships are considered full-time if they carry nine or more credit hours per semester.

Students in the terminal stages of their degree will be considered full-time while carrying less than the requisite credits if they have an approved *Application to Candidacy* on file in the Graduate School, complete a form entitled *Certification of Full-Time Status* AND are working full-time on their thesis, dissertation, or projects

Many Ph.D. students apply for degree candidacy several years before the actual graduation in order to be certified for full-time status as soon as possible. As a result, the proposed program o study and list of courses are highly preliminary and often require future amendments. The Graduate School has clarified that the copy of Application for Candidacy attached to a Full-Time Status

Certification Form can be a *tentative* one that is approved only up to the department level.

Full-time Status for International Students

An F-1 student's principal purpose for being in the United States is full-time study. At the University at Buffalo full-time study is defined as at least:

- 12 credits per semesters for graduate students who do not have an assistantship
- 9 credits per semester for graduate students with an assistantship

Failure to comply with the regulations regarding maintenance of status results in violation of F-1 status. As this could result in serious consequences, students are advised to discuss any questions about full-time status with an advisor at International Student & Scholar Services, 210 Talbert Hall. Students in their first semester in the United States may be excused from the requirement to take 12 credits if they are experiencing difficulties with:

- The English language,
- American teaching methods,
- Inappropriate course level placement.

This lowering of the required number of credits due to academic difficulty is valid only for a student's **first semester in the United States** and only if alternative methods of addressing the academic problem (such as choosing an alternative grading scale, taking an incomplete, outside tutoring, etc). cannot be found. This option is not available to new students at the University who have transferred from within the United States, even if they have changed degree level or major.

The difficulties must be first discussed with an international student advisor, and then documented in writing by the professor of the course or by the student's academic advisor. This must be done prior to the University's established deadline for course resignation available at:

www.src.buffalo.edu/studentaccount/liability.shtml. Details of the student's financial liability for tuition are also outlined at this website.

Once the difficulties and possible solutions have been discussed with your course professor and with an international student advisor, it may be recommended that you drop below full-time Your professor/advisor, then must write a letter to that effect. The letter should:

- Be written on Departmental letterhead
- Be addressed to the Director of International Student and Scholar Services
- Verify that the professor/advisor has discussed the problem with you
- State specifically that he/she recommends you drop the class
- State the reason why he/she recommends that you drop below full-time status. This must be for reasons described above and appropriate details must be provided.

From your second semester thereafter you must register as a full time student unless you meet the criteria for another exemption (as described above). If you continue to experience academic difficulty, you should consult with an international student advisor regarding your situation.

CONTINUOUS REGISTRATION REQUIREMENT

Graduate students must register (and pay all tuition and fees not covered by a tuition scholarship) for a minimum of one credit hour each Fall and Spring term until ALL requirements for the degree are completed. If continuous registration is impossible or inappropriate at any time, the student must secure a leave of absence from the Graduate School. Students may not be on leave of absence during the semester in which a degree is conferred Under some circumstances, this requirement may be waived in the

semester prior to degree conferral if the student has an approved Application to Candidacy on file in the Graduate School and will not be using any University services or faculty time. Students may request a waiver of continuous registration by filing a Graduate Student Petition Form with the Graduate School. Forms are available from the Graduate Studies Secretary, Physics Department office.

LEAVES OF ABSENCE

Requests for leaves of absence must be requested through the Director of Graduate Studies and forwarded to the Graduate School on a Graduate Student Petition Form http://www.grad.buffalo.edu/forms/students/pet_loa.pdf prior to the start of the semester in which the leave is to begin. Normally, leaves are granted for a maximum of one year, but it may be possible to extend the leave if circumstances warrant. All requests must be supported by adequate documentation. "Personal reasons" is not a sufficient explanation for requesting a leave.

International students are advised to consult with the Office for International Student and Scholar Services, 210 Talbert Hall, North Campus, prior to applying for a leave of absence.

CREDIT TRANSFER

In order to transfer credit for a graduate course, a student must petition the Graduate Studies Committee and provide a detailed syllabus for the course as well as the grade received. Only courses with a grade of "B" or better will be considered for credit. The Committee can approve or *disapprove the transfer* depending on the quality of the course, the institution where the course was taken, and the applicant's performance in graduate courses taken here. The Committee has the option of requiring the student to take some form of examination to prove that he/she has mastered the material of the course at a level comparable to our equivalent graduate courses. This task is carried out by the faculty member

who is teaching the course that semester, and can be in written o oral form. The faculty member then reports the recommendation t the Chair, Graduate Studies Committee.

A graduate student is allowed to request transfer credit only afte he/she has completed one semester in our graduate program. B that time, the student will have a good idea of the level of ou graduate courses and the style of the exams. In addition th Graduate Studies Committee can use the grades of the firs semester courses to decide whether or not to allow a graduat student to pursue the requested transfer of credit.

Students from university-approved exchange programs pursuing a M.S. degree are excluded from this procedure.

GENERAL DEPARTMENTAL INFORMATION

Keys

Each new student will be issued a set of keys for his/her office. A deposit of $5.00 is required for each key. If any key is lost, th total deposit is forfeited. Money will be returned to the studen upon return of keys.

Mailboxes

Each graduate student will be assigned a mailbox. Please chec the box daily for important notices, in particular, Teachin Assistants should check daily for homework and lab reports Students will be notified when packages or other large item arrive, these should be picked up as soon as possible in th mailroom.

Home Address and Telephone Number

We ask that you inform the Department office of any change o address or phone number. Forms are available for this purpose. D not use the Physics General Office as your permanent address

The Office of Records and Registration must also know of your address change.

Paychecks

All paychecks can be picked up in the Departmental office AFTER 10:00 A.M. each payday. Please try to pick up your check on the payday or soon afterwards. We are not allowed to hold paychecks for longer than one week. Any paychecks not picked up after a week will be returned to the Payroll Office.

Graduate Student Data

A Departmental Graduate Student Data Form obtained from the Graduate Studies Secretary, Physics Department office, is to be completed by each student upon entrance to the Department and updated as necessary. Information on the data form keeps our records up-to-date.

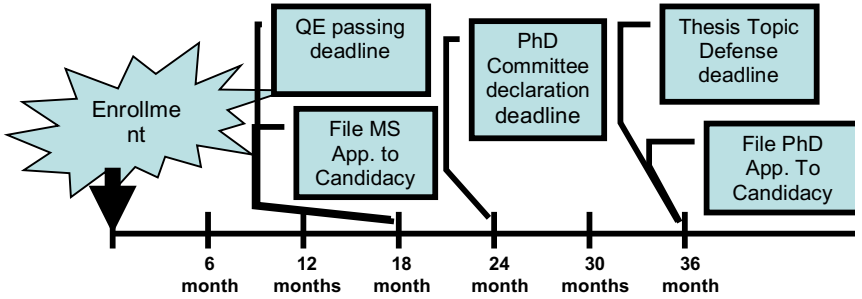
Social Security Number

All newly admitted foreign students must apply for a social security number. Forms and information regarding application for a social security number may be obtained during International Student Orientation or from the International Student and Scholar Services Office, 210 Talbert Hall. Please inform the Departmental office of your social security number.

Forwarding Address

Please inform our office of your forwarding address if you plan to be away for a long period of time, or are permanently leaving the Department.

APPENDIX A: Graduate Study Timeline



APPENDIX B: Responsible Conduct in Intellectual and Creative Activity

Physics Department Statement on Academic Integrity:

Academic integrity is a core value underlying all scholarly activity in the Department of Physics. The worth of every degree conferred and every project performed is directly dependent on the ethical conduct of every individual in the Department. Accordingly, all members of the Department are expected to adhere to the highest standard of scholarly integrity. It is the responsibility of each individual to understand what does and does not constitute ethical scholarly behavior, and to practice academic integrity in all scholarly activities. This statement is based on the UB Office of Judicial Affairs statement on Academic Dishonesty, which is available on-line at: www.grad.buffalo.edu/policies/academicintegrity.php#consultative Policies related to responsible conduct in research are available at: http://www.research.buffalo.edu/ovpr/policies/rescond.cfm

You should familiarize yourself with your rights and responsibilities under the Graduate School's Academic Integrity Policy. Some specific actions which constitute academic dishonesty include (from Article 3 of the Academic Integrity Policies and Procedures, University at Buffalo found at www.grad.buffalo.edu/policies/academicintegrity.php#dishonesty:

- **Previously submitted work**. Submitting academically required material that has been previously submitted -- in whole or in substantial part -- in another course, without prior and expressed consent of the instructor.
- **Plagiarism**. Copying or receiving material from any source and submitting that material as one's own, without acknowledging and citing the particular debts to the source (quotations, paraphrases, basic ideas), or in any other manner representing the work of another as one's own.

- **Cheating**. Soliciting and/or receiving information from, or providing information to, another student or any other unauthorized source (including electronic sources such as cellular phones and PDAs), with the intent to deceive while completing an examination or individual assignment.
- **Falsification of academic materials**. Fabricating laboratory materials, notes, reports, or any forms of computer data; forging an instructor's name or initials; resubmitting an examination or assignment for reevaluation which has been altered without the instructor's authorization; or submitting a report, paper, materials, computer data, or examination (or any considerable part thereof) prepared by any person other than the student responsible for the assignment.
- **Misrepresentation of documents**. Forgery, alteration, or misuse of any University or Official document, record, or instrument of identification.
- **Confidential academic materials**. Procurement, distribution or acceptance of examinations or laboratory results without prior and expressed consent of the instructor.
- **Selling academic assignments**. No person shall sell or offer for sale to any person enrolled at the University at Buffalo any academic assignment, or any inappropriate assistance in the preparation, research, or writing of any assignment, which the seller knows, or has reason to believe, is intended for submission in fulfillment of any course or academic program requirement.
- **Purchasing academic assignments**. No person shall purchase an academic assignment intended for submission in fulfillment of any course or academic program requirement.
- **Selling academic assignments**. No person shall, for financial consideration, or the promise financial consideration, prepare, offer to prepare, cause to be prepared, sell or offer for sale to any person any written material which the seller knows, is informed or has

reason to believe is intended for submission as a dissertation or thesis, term paper, essay, report, or other written assignment by a student in a university, college, academy, school or other educational institution to such institution or to a course, seminar or degree program held by such institution.

- **Selling computer assignments.** No person shall sell or offer for sale to any person enrolled in the State University of New York any computer assignment, or any assistance in the preparation, research, or writing of a computer assignment intended for submission in fulfillment of any academic requirement.

Additional policies relating to specific courses and assignments, such as rules regarding collaboration on coursework, may be specified by the course instructor.

A breach of academic integrity reflects upon the scholarly reputation of the entire Department. Therefore, incidents of academic dishonesty will be investigated immediately and vigorously. A student suspected of violating course, Departmental, or University policies on academic integrity will be notified by the course instructor. Where possible, questions of academic dishonesty will be resolved through informal consultation between the student and the instructor. If informal consultation does not resolve the issue with mutual agreement, the student has the right to ask for an appeal of the instructor's decision. If the instructor feels that the circumstances of the alleged academic dishonesty warrant additional review, formal procedures may be used. Complete Graduate School procedures regarding academic infractions, including the right to appeal, are available at: www.grad.buffalo.edu/policies/academicintegrity.php#consultative

Depending on the severity of the violation, a first incident of academic dishonesty may result in one or more of the following actions:

- Failure of the assignment or examination on which misconduct occurred.

- Mandatory resignation from the course in whicl misconduct occurred.
- Failure for reason of academic dishonesty in the course ir which misconduct occurred.
- Permanent loss of Departmental financial support including Teaching Assistantships, Researcl Assistantships, and scholarships.

Any such action will be noted in the student's confidentia Departmental record. A second violation will result in th Department seeking permanent dismissal from the major and a ba from enrollment in any Departmental courses. Particularly seriou infractions will result in a recommendation of suspension o expulsion from the University.

APPENDIX C: SPEAK Test Policy

According to the English Language Institute (ELI), a graduate student achieving a score of 55 or 60 on the SPEAK test is approved to teach. If an individual receives a 45 or 50, their department may request an oral evaluation at ELI in the form of a teaching demonstration. Before a department can request this evaluation, that Department is required to assess each individual to determine their communication abilities. Successful completion of the ELI evaluation certifies the graduate student to teach, hold office hours or perform other duties requiring speaking to students. More details can be found at the ELI website: www.wings.buffalo.edu/gse/eli/esl_speak.htm.

The Physics Department has formed a committee to evaluate graduate students with SPEAK test scores of 45 or 50; members include the Supervisor, Introductory Labs and two faculty members. Interviews will be coordinated by the Supervisor and all inquiries should be addressed to him.

Periodically, open interviews will be held to assess individuals with SPEAK test scores of 45 or 50 to determine if their level of English proficiency is such that they warrant an oral evaluation by ELI. These interviews simply support the student's ability to take an oral evaluation at ELI, and do not imply a promise or intent to provide support. Successful completion of this interview and the subsequent ELI oral evaluation will certify the graduate student to teach (lab only or lab and recitation), but there may not be any positions available. Assuming the student meets the other criteria for a Teaching Assistantship (see Department of Physics Information Handbook for Graduate Students), they would be placed on a stand-by list to be considered with other qualified applicants for available positions. Supported students who fail to pass the SPEAK test or an ELI oral evaluation within 1 year of arrival may have their support terminated.

The format of these pre-screening interviews will be as follows you will be given a laboratory introduction to present. You wil have 15 minutes for the presentation using only your notes and a chalkboard. The Committee will have up to 5 minutes at the end to ask you questions. It will then be decided whether or not to recommend you receive an ELI oral evaluation. You will be evaluated primarily on your ability to communicate, bu consideration may be given to your level of mastery of the physics and laboratory practices described in the presentation.

There will be a general announcement made, either by email, office mail box, or bulletin board posting announcing when interviews will be held.

If a student is not recommended for an oral evaluation at ELI, or if they do not successfully complete the formal ELI oral evaluation after passing a Department level screening, they will not receive another Department level screening unless they do one of the following:

1. Retake the SPEAK test and show an improvement ove their best score.

2. Register for and successfully complete one of the remedia courses offered by ELI, currently ELI 411, ELI 412, or EL 512. Non-credit courses such as the "American English Pronunciation" course are also acceptable. For the purposes of being granted another Department screening each course may only be taken once.