Handbook of

Academic Requirements & Procedures

for the

Chemistry/Biotechnology Graduate Program

Department of Chemistry

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Available at - http://chem.tufts.edu/grad/Biochem Handbook June 2018.pdf

TABLE OF CONTENTS

1. INTRODUCTION.

1.1 *Graduate Programs in Chemistry/Biotechnology.* The Department offers programs leading to the degrees of Master of Science (M.S.) for students seeking an education at an advanced level in chemistry/biotechnology and Doctor of Philosophy (Ph.D.) for those preparing for careers in which chemical/biotechnology research is a central activity.

1.2 *Purpose and Content of the Handbook.* A detailed account of the academic requirements and procedures is provided for graduate students in chemistry/biotechnology. The intent is to describe the programs and explain the rationale behind them; to delineate the responsibilities of students, faculty committees, faculty members and the administration of the Department; to promote consistency in procedures and standards; and to provide a basis for communication between the faculty and students regarding expectations for performance and achievement.

1.3 *General Information.* A general summary of the academic structure is found in the Tufts University Arts & Sciences Bulletin. Graduate School regulations are found in the "Guide for Graduate Students" available in the Graduate School office. A description of the graduate program is available in the chemistry office. **It is the responsibility of each graduate student to become aware of the academic requirements, procedures and deadlines of the Graduate School of Arts and Sciences, the Department of Chemistry, and the Biotechnology Center** (when applicable).

1.4 *Transferring to the Chemistry/Biotechnology Graduate Program from the Chemistry Program.* Students enrolled in the Chemistry Program who are considering transferring to the Chemistry/Biotechnology Program are encouraged to speak to the Chairs of the Chemistry Graduate Committee and the Chemistry/Biotechnology Joint Graduate Committee.

2. THE JOINT GRADUATE COMMITTEE (JGC)

2.1 *Channels of communication.* All communications from students concerning clarification of and petitions for exceptions from the rules described in this handbook should be addressed to the Chair of the joint Chemistry/Biotechnology Joint Graduate Committee. This committee is charged with the responsibility of monitoring a student's progress through the rules and requirements delineated in this handbook, and is composed of members from the Chemistry Department and the Biotechnology Center.

2.2 *The Role of the Joint Graduate Committee.*

(a) The JGC serves as the interim academic advisor when the student enrolls. The committee will advise in planning a program which will provide the core and background needed in the student's area of intended concentration. The JGC Chair will approve the student for registration on SIS Online (Tufts electronic course registration system).

(b) The JGC is charged with determining whether Tufts University courses outside the chemistry department are acceptable for graduate credit. Requests must be in the form of a petition to the committee and must include a course description.

(c) The JGC is charged with the evaluation of transfer credits for entering students with previous graduate course work according to the policies described in Section 3.5. Requests are made using **Form D**.

(d) The major responsibility for advising passes to the student's research committee when appointed (see Section 5). However, the JGC continues to monitor each student's progress in its record-keeping capacity.

2.3 *Academic review*. At the end of each semester, the student's record is reviewed by the JGC. Candidates with unsatisfactory progress will be placed on academic probation (Section 10).

3. REQUIREMENTS AND QUALIFICATION FOR DEGREE

3.1 *Responsibility.* A graduate student accepted into the M.S. or Ph.D. program must satisfy all requirements for that program. To obtain the Ph.D. degree, students must complete the requirements according to the time table delineated below, unless a written exemption is obtained from the Joint Graduate Committee. The Ph.D. is a research degree that culminates in a thesis defense; making sufficient progress in research is the primary responsibility of the Ph.D. students. Even though a periodic review is made by the Committee, **each student is personally responsible for ensuring that all requirements are fulfilled.**

3.2 *The Core Requirement for Ph.D. Candidates*

(a) In order to fulfill this requirement the student must demonstrate proficiency in organic chemistry, biochemistry, molecular biology, and in one other traditional area of chemistry (analytical, inorganic, or physical). Proficiency is demonstrated by passing with a grade of B- or better in five graduate level courses in these areas, as follows: one course in organic chemistry (CHEM 150, 151, 152, or 155), two courses in biochemistry (CHEM 171 and 172), one course in molecular biology (BIO 105 or equivalent), and one additional chemistry class (CHEM 131, 132, 133, 134, 136, 141, 142, 144, 145, 146, 161, 162, 164, or 165).

(b) The core requirement must be fulfilled by the end of the student's **third** semester in residence or the student will be placed on probation.

(c) Students who do not fulfill the core requirement by the end of the fourth academic semester will not be allowed to continue in the Ph.D. program.

(d) Students may place out of **one** of the five courses needed to satisfy Core Requirement if they demonstrate graduate proficiency in that area by some other means. The particular way in which proficiency is demonstrated is at the discretion of the faculty who are in that division. *Placing out of a Core Requirement earns no course credit.*

(e) For a transferred course to be counted toward the Core Requirement, the Department must give its written approval by checking the appropriate section of Form D.

3.3 *Course Requirement for Ph.D. Candidates.*

(a) Ph.D. candidates must complete a total of seven graduate level courses (course numbered between 100 and 294, inclusive, but not including 0191, 0192, and 0293 - Professional Skills in Chemical Research) with a grade of B- or better. The seven courses include those taken to fulfill the core distribution requirement plus two additional graduate-level courses in chemistry or biotechnology. The course requirement must be fulfilled by the end of the fourth academic semester or the student will be placed on probation. Students who do not fulfill the course

requirement by the end of the fifth academic semester will not be allowed to continue in the Ph.D. program.

(b) Graduate courses taken in related fields outside the Chemistry Department or Biotechnology Center must first be approved by the research advisor.

(c) Full-time Ph.D. students should register for Chem0502 (Doctoral Continuation, Full-time). Part-time Ph.D. students should register for Chem0501 instead (Doctoral Continuation, Part-time). Every semester after the student joins a research group, the research advisor will formally evaluate the student's progress toward the degree as Satisfactory or Unsatisfactory. At the end of their first summer, students are required to submit to the joint graduate committee a 1-2 page research report that must be signed by student's research advisor.

(d) First-year students are required to take year-long course Chem0291 (Fall) and Chem 0292 (Spring): Professional Skills in Chemical Research.

(e) First-year students are required to register for Chem0191 (Fall) and Chem0192 (Spring), Seminars in Chemistry. All graduate students are **required** to attend the departmental seminar series to broaden their exposure to many of the current areas of research activity. Attendance is noted, and demonstrates to the faculty that a student is genuinely interested in all aspects of chemistry.

(f) *Teaching Requirement.* All graduate Ph.D. students are required to serve in a teaching capacity for a minimum of one semester. Two semesters are strongly recommended. Students serving as teaching assistants should register for Chem0405TA. TA support is contingent upon adequate performance and full cooperation with the instructor of the course and the Manager of Chemical Labs.

3.4 *Course Requirements for M.S. Candidates.*

(a) All M.S. candidates must complete at least 10 graduate level courses with B- or better grade, totaling at least 30 credits, in chemistry, biotechnology or approved related fields. Three of these courses must be in chemistry (not including 191 and 291), one in biochemistry and one in molecular biology. No more than 2 courses that count (6 credits) can be awarded for research towards the 30 credit requirement. The courses must be chosen in consultation with the JGC. Credits earned from Chem 0291/0292 - Professional Skills in Chemical Research can count towards the M.S. Degree. Credits earned from Chem 0191/0192, Seminars in Chemistry, can also count towards the M.S. degree. For the purposes of counting courses, the sequence Chem 0291/0292 counts as one course, as does the Chem 0191/0192 sequence.

(b) Students may also elect to prepare a Master's thesis, which they must then present and defend before their research committee.

(c) In lieu of research credit, two courses totaling no more than six credits may be approved independent study.

(c) M.S. students are encouraged to take the year-long course Chem 291/292:Professional Skills in Chemical Research.

(d) First-year M.S. students are encouraged to take Chem 0191, Seminars in Chemistry. M.S. students are encouraged to attend the departmental seminar series to broaden their exposure to many of the current areas of research activity. Attendance at seminars is noted.

3.5 *Joint Graduate Committee policies for transfer of graduate course credit.*

(a) Graduate courses taken prior to enrollment in the Tufts graduate program (taken at Tufts or elsewhere) may, under certain circumstances, be transferred and counted

towards a Tufts graduate degree. Students wishing to transfer a course should file a written petition (attached **Form D**) with the JGC. For a course to be eligible for transfer, the student must have earned a grade of B- or better in that course.

(b) No more than two of the total required courses may be transferred from another institution for M.S. or Ph.D. candidates. An additional two graduate courses may be transferred if taken at Tufts.

(c) Courses transferred must not have been counted toward a previously conferred baccalaureate degree. However, courses used towards advanced degrees earned at other institutions may be transferred, subject to the two course maximum.

(d) Students should consult the Graduate School "Guide for Graduate Students" prior to submitting **Form D** to the JGC.

4. RESEARCH ADVISOR

4.1 *Selection of the Research Advisor.*

(a) The research advisor is the faculty member with whom the student chooses to collaborate on their dissertation research project. Most often, the student selects a problem from among several that the professor may suggest as appropriate for the M.S. thesis or the Ph.D. dissertation. The student is expected to contribute to the direction of the work as the research progresses.

(b) During the fall semester, departmental research seminars provide a forum for faculty members to describe their research interests and activities. All entering graduate students are **required** to attend. Graduate students **may not** officially join a research group until after all the research seminars are completed.

(c) New students are strongly encouraged to inform themselves about the research interests of the faculty by reading background material in the library, requesting reprints for in-depth study, and especially by visiting those professors and their graduate students whose work appears to be of greatest interest. These visits are the occasion for detailed discussions of the research the student might undertake for the degree.

(d) In their first semester in the program, students are responsible for scheduling meetings with multiple faculty members and discussing the possibility of joining their research groups. The professor and the student should discuss the initial research problem on which the student would begin, the likely sources of financial support during the academic year and summer, and course work or other requirements the professor feels are essential to the proposed research. The selection should be done thoughtfully, as student and research advisor normally work together very closely, and each has a vital interest in the progress of their collaboration.

(e) Selections for research advisor will be performed simultaneously with selections by Chemistry graduate students. Students will submit three ranked choices of research groups to the Chair of the Chemistry graduate committee (the deadlines will vary from year to year, but will generally fall within the first two weeks of November). The joint graduate committee will review the students' proposals, and will match the students' interests with available openings in research groups. Every effort will be made to place students into their most preferred research group. If necessary, consultations among students and faculty will continue until mutually acceptable

outcomes are reached. Maximizing the fit is the ultimate goal of this process. The students are encouraged to talk to the JGC chair and members during this process, to ask any questions, and to raise any concerns that may arise. The students will officially join the groups when the graduate committee notifies the department that the matching process is completed. Usually, the students join research groups in November-December, by the end of their first semester.

5. RESEARCH COMMITTEE

5.1 *Selection and Purpose.*

(a) When the student is ready to begin reporting the results of the research or is to present a study topic (Section 6), the student and research advisor meet to choose a formal research committee. The committee is comprised of the research advisor and at least two other faculty members from Chemistry or the Biotechnology Center who agree to serve on the research committee. An additional member outside the department may also serve on a committee. The latter is particularly desirable when a student chooses an interdisciplinary research problem.

(b) The research committee is charged with the following duties:

(i) Continue the academic advising function.

(ii) Approve and evaluate the Ph.D. candidate's study topics.

(iii) Evaluate the written & oral defense of the original research proposal.

(iv) Evaluate the written & oral defense of the student's thesis research.

5.2 *Periodic Evaluation*. The research committee meets periodically to evaluate the student's progress. These evaluations may result in the following actions (Ph.D. only).

(a) Continuation in the Ph.D. program, which may be conditional upon satisfaction of a prescribed set of requirements.

(b) Academic probation.

(c) Continuation in a M.S. program. This recommendation should be discussed with the student and should be consistent with the student's career objectives.

(d) Dismissal from the program.

5.3 *Committee Meetings*

(a) One week prior to each committee meeting (study topics and proposal), the student will provide a Research Progress Report for discussion at the meeting. Questions regarding the research will be part of the meeting and the student's research progress will be a criterion for successful completion of the requirement. If the student's committee deems that research progress is insufficient, they may decide to meet again after a finite time period to reevaluate the progress. Lack of progress in research will be cause for dismissal from the program.

(b) The Research Progress Report should be a brief (no more than two page) summary of research accomplished. The report should have two parts: a statement of the overall research goals of the thesis project(s), and an outline or summary of the student's research accomplishments since the last committee meeting. The student should *not* prepare a formal oral presentation about the research for the committee meeting, but should be prepared to answer questions from the committee about the research.

(c) After each meeting of the committee, the student's research advisor will write a letter summarizing the student's strengths and weaknesses identified during the meeting. Specific topics the student needs to work on as well as issues regarding oral and writing skills should be discussed in the letter. The letter will be approved by all the attending committee members and given to the student. A copy will be placed in the department file for future reference.

6. STUDY TOPICS (Ph.D. Candidates)

6.1 *Purpose*. Research chemists are often called upon to give an oral presentation of research work. The seminars and the discussions which normally follow provide an important means of scientific communication. Hence, it is necessary to learn how to present effective seminars. Breadth and depth in the major field is demonstrated by successfully completing two independent study topics. An additional purpose of the study topics is to encourage students to use the library and on-line resources to master a topic in their major field (for any topics covered in introductory graduate courses, this would mean a level beyond the course).

6.2 *Content.* The subject matter for the topics must be selected in consultation with the research advisor. Each study topic requires a written and oral presentation. One of the Study Topics, generally the first, must be presented as a departmental seminar. The written reports must be detailed enough to reflect a thorough graduate-level understanding of the subject and include references to the relevant literature.

6.3 *Presentation.* Annually, when the Department has determined available seminar dates, a sign-up sheet will be posted in the chemistry office. Students wishing to present a public study topic in that year should select a date for presentation from the available list on a first come first served basis. The private (generally the second) study topic need only be scheduled with the research committee. The written report should be submitted to the research committee at least **one week** prior to the presentation. The presentation is made with all research committee members present. Only under extenuating circumstances should the presentation be made with only two committee members present. In this case the third member must, through consultation with the other members and evaluation of the written report, concur with the other research committee decision. The entire committee must be present for at least one of the study topic presentations.

6.4 ***Policy on Cancellation of Public Study Topics.*** In the event that a scheduled public study topic is cancelled by the presenter, the Joint Graduate Committee will **not** reschedule the seminar for the same semester as the cancellation. The student will be given an opportunity to sign up for a seminar date in the next semester *after* all other students wishing to present a study topic have selected dates. If a student is in her/his fourth semester in residence at the time of cancellation, then cancellation of the seminar is functionally equivalent to dropping out of the Ph.D. program.

If the student has a legitimate and serious reason for canceling the seminar (such as grave illness or bereavement), and the student wishes to reschedule the seminar for the same semester, s/he may submit a written petition to the Joint Graduate committee requesting a waiver of the policy.

6.5 *Completion Date.*

(a) Students are encouraged to complete the first study topic before the end of the third semester. Students must have attempted both study topics by the end of their fourth semester. A student who has not attempted both study topics by the end of their fourth semester will be dismissed form the Ph.D. program.

(b) If a student has attempted both study topics but has not successfully completed the requirement by the end of the fourth semester, the student will be placed on academic probation for one semester. At the end of the probationary semester, the student may not continue in the doctoral program if the requirement remains unsatisfied.

(c) Following each attempt of a study topic, the student must file **Form A** or **B** (appendix).

6.6 *Guidelines for Preparing and Presenting the Study Topics.* The student must meet the minimum guidelines listed below in order to complete successfully the study topic requirement.

(a) *Written Reports*

1. The written report must be prepared, with adequate attention to style, clarity, organization, and all material (data figures, tables, etc.) thoroughly referenced.
2. The study topic must demonstrate a proper reliance on the primary literature and not be drawn principally from the review literature.
3. The written report should be aimed at a specialist readership and should be similar in style to a review article in the student's field of specialization. Although the length of the written report is dictated by the content, the suggested length is *ca.* 15-20 pages; the written reports typically cite ca. 20-30 references.
4. The study topic must demonstrate a sufficient synthesis of ideas and critical analysis of the subject matter, and go beyond simple summaries of individual primary papers. Direct quotes from the literature should be used sparingly and must always be referenced. Figures copied from the primary sources should also be thoroughly referenced. (See Section 11 **Plagiarism**)

(b) *The Public Seminar (Generally the first Study Topic)*

1. The oral presentation must be sufficiently detailed and reflect a graduate-level understanding of the topic. The presentation should be aimed at a chemically educated general audience, not a lay audience.
2. The formal presentation shall be of adequate length (45-55 minutes).
3. The oral presentation and responses to questions must be lucid.

(c) *The Private Oral Presentation (Generally the second Study Topic)*

The private oral presentation should be aimed at a specialist audience and should last 40 -50 minutes. Generally, this presentation will be interrupted frequently by questions from the Research Committee and will therefore be more of a dialogue than the public seminar.

(d) *General Guidelines*

1. The student must demonstrate a thorough knowledge of the subject material both in the written and oral presentations, and in response to questions from the audience or the student's committee.
2. The student must display a familiarity with the relevant experimental or computational methods presented.
3. The student must be able to place the study topic in the broader context of the

field. This may be done by demonstrating a reasonable awareness of related techniques and subject matter and being able to evaluate and compare them.

4. Anything the student writes or presents is assumed to have been a product of their own independent research and reflection, and written in their own words. Thus, the student should understand and be able to explain any words, formulas, or concepts, which they use in their written or presented topic.

6.7 *Evaluation.*

(a) At the end of the oral presentation, the committee will conduct a private oral exam of the student. The student may be questioned about any subject matter presented in the study topic, including experimental details, the research progress report, and any other subject areas deemed germane by the committee.

(b) All faculty in attendance at the public seminar shall fill out a questionnaire (see attached Study Topic Evaluation-Faculty Audience Member). When the question period is complete, the committee chair will collect the forms from the faculty and will use them to assess whether the student's public seminar met the expectations of the department faculty. Individual forms or summaries of the audience faculty responses will be provided to the student. Other members of the audience (e.g. grad students, postdocs) may also fill out forms (see attached Study Topic Evaluation-General Audience Member) and return them directly to the student; these forms will not be used by the committee.

(c) The committee will evaluate the student's performance by the criteria on the attached form (Study Topic Committee Evaluation Form) that summarize the requirements. Each committee member must either Pass or Fail the student. If *any* of the criteria are not met, the student must fail. If the student fails, he/she must present and pass a new study topic on a different subject by the end of the probationary semester. In committees where there is a positive, but split, vote, then homework may be assigned to allay the concerns of the dissenting member. If the study topic requirement is not completed by the end of the probationary semester, the student will be dismissed from the Ph.D. program.

7. ORIGINAL RESEARCH PROPOSAL (Ph.D. Candidates)

7.1 *Definition and Purpose.* The research proposal is based on the literature rather than on the student's own research. It provides the opportunity to demonstrate both understanding and originality. The original proposal consists of a written document and an oral presentation and defense before the research committee.

7.2 *Role of Research Committee.* As described in Section 5, the student's research committee will advise on the preparation of the proposal, and is charged with evaluating it as sufficient to satisfy this portion of the degree requirement.

7.3 *Guidelines for preparing the original proposal.*

(a) The written portion of the proposal should be in the form of a grant application (typically, in the NSF or NIH format) with objectives/specific aims, significance, introduction/background, proposed work, method of attack/approach, experimental procedures, potential problems with suggested solutions, expected outcomes, and a conclusion. The proposal should be self-contained and include sufficient material to demonstrate the value, originality and creativity in the proposed research. The

student should consult his/her research advisor on whether a budget must be included.

(b) The proposal as a whole is to be developed **independently**. Faculty or other students may provide only limited assistance with specific technical problems.

(c) If advice is needed as to whether a problem is suitable as a basis for a proposal, a meeting should be scheduled with the research committee to discuss these matters.

(d) A copy of the proposal should be given to each member of the research committee at least **one week before** its presentation/defense.

(e) The statement of the problem must be precise and unambiguous. There should be no room for doubt as to what is meant.

(f) The literature pertaining to the problem should be documented. A consistent set of bibliographic conventions, preferably those used by a leading journal in the area of the proposal, should be used.

(g) The method of attack or approach should be described fully, including the feasibility of each step in the process proposed for solving the problem.

(h) The probable results of the proposed research and the conclusions which would follow from each, should be fully described.

(i) Assumptions and uncertainties should be stated explicitly.

(j) An estimate of the time required to carry out the research should be made on the basis that the student would conduct the work. A budget detailing costs for equipment, computer time, and materials, should also be included if recommended by the research advisor.

7.5 *Completion Date.* The proposal must be successfully defended no later than the end of the **eighth semester** in residence. Students failing to complete this requirement will be placed on academic probation for one semester. The requirement must be completed by the end of the probationary semester or the student will be dismissed from the Ph.D. program.

7.6 *Evaluation*

(a) At the proposal defense, the research committee will discuss the proposal by probing the areas emphasized above. If appropriate, related aspects of the proposal may also be discussed. The proposal will be judged on the basis of novelty of the research idea and the suitability of the proposed method of attack. The objective is to assess the independent research ability of the student at this stage of the Ph.D. degree work. The research committee will generally also ask questions about the research report. The research committee will deliberate in private at the conclusion of the defense and immediately inform the student of their decision. Upon approval of the research proposal by the research committee the student must file **Form C** (Appendix) with the Chair of the Joint Graduate Committee.

7.7 *Possible Actions of the Research Committee.*

(a) Acceptance of proposal.

(b) Acceptance with *minor changes*. This action requires the candidate to incorporate the minor changes, but allows for the signatures of all committee members at the conclusion of the defense with no further re-examination necessary.

(c) Acceptance contingent upon satisfactory completion of *major changes*. This category requires a re-examination of the corrected proposal by the committee, but no repetition of the oral examination.

(d) Rejection. This action requires the student to prepare a new proposal

8. THESIS AND FINAL ORAL DEFENSE (M.S. and Ph.D. Candidates)

8.1 *Requirements.* The "Guide for Graduate Students" published by the Graduate School of Arts and Sciences specifies the general thesis regulations. This section sets forth the requirements of the Chemistry Department. Additional requirements for the thesis may be imposed by the research advisor/committee. The Chemistry Department requires, as part of the procedure by which a thesis is approved, a formal oral defense by the candidate before an examination committee. This committee recommends action to the university regarding the thesis. The Chair of the Chemistry Department certifies completion of the degree requirements and recommends to the Dean of the Graduate School that the degree be awarded.

8.2 *Selection and composition of the Examination Committee.*

(a) Three members of the Department and an additional member from outside the University are required for the Ph.D. thesis defense. Ordinarily, the members of the student's research committee serve as the Examination Committee. For the sake of maintaining the continuity of the committee, faculty members who have left the department during the year preceding the thesis defense may be considered as Department committee members.

(b) Copies of the thesis must be delivered to the examination committee **at least TWO weeks prior** to the examination.

(c) The student, in consultation with the Chair of the Examination Committee, arranges the time and place and notifies the Department Chair at least **TEN days** in advance.

(d) M.S. examinations must be announced to the faculty of the Department, and Ph.D. examinations to the faculty of the University in the form of written announcements including the information listed below. A copy of the notice is also put into the student's file.

(i)Name of Student
(ii) Degree
(iii) Title of Thesis
(iv) Names of Examining Committee, Chair and research advisor.
(v) Time and place of examination
(vi) Department of Chemistry

8.3 *Presentation & Defense.* As part of the Ph.D. requirements, the Ph.D. candidate **is required to make a public presentation** of the thesis work which is to be followed by a **private oral defense** in front of the Examination Committee.

8.4 *Possible actions of the Examination Committee.*

(a) Acceptance of dissertation/thesis.

(b) Acceptance with *minor changes*. This action requires the candidate to incorporate the minor changes, but allows for the signatures of all committee members at the conclusion of the defense with no further re-examination necessary.

(c) Acceptance with *major changes*. This category requires a re-examination of the corrected thesis by the committee, but no repetition of the oral examination.

(d) Rejection. This action requires the student to prepare a new thesis, and generally involves additional research work. The Examination Committee will address a brief memorandum apprising the Department and JGC Chairs of the situation.

9. ACADEMIC PROBATION

9.1 *Conditions Leading To Probation.* Academic probation is a formal status a graduate student assumes when they have not met the requirements to remain in the program. Some reasons for a student being placed on probation include:

(a) Unsatisfied core requirement (Sec. 3.2a) at the beginning of the fourth semester in residence (Ph.D. only).

(b) Low overall grade point average in course work (less than B-).

(c) Course requirement not met after four semesters (Ph.D. only).

(d) Study topics not completed after four semesters (Ph.D. only).

(e) Original proposal not completed after 8 semesters.

(f) Failure to meet deadlines or fulfill requirements stipulated by the student's research advisor or research committee.

9. 2 *Rectification.* A student on probation has one full semester to rectify the deficiency. **Academic probation can only be removed by the Joint Graduate Committee.**

9.3 *Consequences.* If not rectified by the end of the probationary semester the student will face dismissal from the graduate program. Such Ph.D. candidates may receive a M.S. degree if they have completed the requirements for that degree at the end of their probationary semester. Students on probation may become ineligible to receive a teaching or research assistantship or other financial assistance including federal aid.

10. PLAGIARISM *(Adapted From: Academic Integrity at Tufts, Dean of Students,1996)*

10.1 *A Definition of Plagiarism (From: H. Martin & R Ohmann, The Logic and Rhetoric of Exposition, Revised Edition, Holt Rinehard,1963)*

The academic counterpart of the bank embezzler and of the manufacturer who mislabels their products is the plagiarist, the student or scholar who leads the reader to believe that what they are reading is the original work of the writer when it is not. If it could be assumed that the distinction between plagiarism and honest use of sources is perfectly clear in everyone's mind, there would be no need for the explanation that follows; merely the warning with which this definition concludes would be enough. Bit it is apparent that sometimes those of good will draw the suspicion of guilt upon themselves (and, indeed, are guilty) simply because they are not aware of the illegitimacy of certain kinds of "borrowing" and of the procedures for correct identification of materials other than those gained through independent research and reflection.

The spectrum is a wide one. At one end there is a word-for-word copying of another's writing without enclosing the copied passage in quotation marks and identifying it in a footnote, **both** of which are necessary. (This includes, of course, the copying of all or any part of another student's paper). It hardly seems possible that anyone of college age or more could do that without clear intent to deceive. At the other end there is the almost casual slipping of a particularly apt term which one has come across in reading and which so admirably expresses one's opinion that one tempted to make it personal property. Between these poles there are degrees and degrees, but they may be roughly placed in two groups. Close to outright and blatant deceit – but more the result, perhaps of laziness than of bad intent – is the patching together of random jottings made in the course of reading, generally without careful identification of their source, and then woven into the text, so that the result is a mosaic of other people's ideas and words, the writer's sole contribution being the cement to hold the pieces together. Indicative of more effort, and for that reason, somewhat closer to honesty, though still dishonest, is the paraphrase, an abbreviated (and often skillfully prepared) restatement of someone else's analysis or conclusion, without acknowledgement that another person's text has been the basis for the recapitulation.

The examples below should help clarify the differences between honest and dishonest use of source material. If instances occur in which these examples do not seem to apply, common sense and the use of the guidelines presented here should be of help in deciding.

10.2. *The Source*

It is in the nature of nature that its fuzzy details and seeming obscurities are clues to the world within. Optical rotation appears a curiosity even today, dealing as it does with the ability of some substances to rotate the plane of polarized light- a discovery made in France in the early nineteenth century. Light is a wave. With that wave there move along electric and magnetic fields, oscillating in space and time. In normal light the wavelike oscillation takes place in every plane. But it is possible to filter out "plane-polarized" light, which is still light, still possessing color and intensity, but different in the following way- in plane-polarized light the electric and magnetic fields that make up the light are restricted to oscillating in only one plane. The filters

that create such special light from ordinary light are called polarizers. You've seen them in sunglasses and some airplane windows, and the Polaroid Corporation has made a lot of money on them.
From: R. Hoffman, The Same and Not The Same, Columbia U. Press, 1995, pp. 36-37

10.3 *Word-for-word*

The world contains many fuzzy details, which at first may appear to be obscurities, but they are actually clues to what's left to be revealed. Optical rotation appears a curiosity even today, dealing as it does with the ability of some substances to rotate the plane of polarized light-a discovery made in France in the nineteenth century. Light is a wave. With that wave there move along electric and magnetic fields, oscillating in space and time. In normal light the wavelike oscillation takes place in every plane. But it is possible to filter out "plane-polarized" light, which is still light, still possessing color and intensity, but different in the following way- in plane-polarized light the electric and magnetic fields that make up the light are restricted to oscillating in only one plane. The filters that create such special light from ordinary light are called polarizers. They are used in sunglasses and some airplane windows, as well as in Polaroid photographs.

This writer copied the text almost exactly, with only a few small changes in the first and last sentences. If the writer had enclosed all the copied text in quotation marks and had identified the source in a footnote, they would not have been liable to the charge of plagiarism; a reader might justifiably have felt, however, that the writer's contribution to the discussion was not very significant.

10.4 *The Mosaic*

The manner in which some substances are able to rotate the plane of polarized light, called optical rotation, was a discovery made in France in the early nineteenth century, but still remains somewhat of a mystery even today. Light is a wave that moves along electric and magnetic fields. In normal light the wavelike oscillation of light takes place in every plane. "Plane-polarized" light, on the other hand, has magnetic and electric fields that are restricted to oscillating in only one plane. But it is still light, possessing color and intensity. Polarizers are filters that create such special light from ordinary light. Polarizers are used often in modern technology. They are seen in sunglasses, some airplane windows, and, of course, Polaroid photographs.

Note how the following phrases have been lifted out of the original text and moved into new patterns:

- rotate the plane of polarized light
- a discovery made in France in the early nineteenth century
- Light is a wave
- In normal light the wavelike oscillation...takes place in every plane
- are restricted to oscillating only in one plane
- create such special light from ordinary light

As in the first example, there is really no way of legitimizing such a procedure. To put every stolen phrase within quotation marks would produce an almost unreadable, and quite worthless, text.

10.5 *The Paraphrase (P) of the Original (O)*

(P): Optical rotation is still somewhat of a marvel today, as it deals with the way in which some
(O): Optical rotation appears a curiosity even today, dealing as it does with the ability of some

(P): substances are able to shift the plane of polarized light. Ordinary light contains wavelike
(O): substances to rotate the plane of polarized light...In normal light the wavelike oscillation

(P): oscillations in many planes. Plane-polarized light, however, contain electric and magnetic
(O): takes place in every plane ...in plane-polarized light the electric and magnetic fields that

(P): fields that oscillate in just one plane. The filters that allow for separation into this kind
(O): make up the light are... in only one plane. The filters that create such special light from

(P): of light are called polarizers. Polarizers are used in sunglasses, various types of airplane
(O): ordinary light are called polarizers. You've seen them in sunglasses and some airplane

(P): windows, and the Polaroid Corporation has seen high profits from them.
(O): windows, and the Polaroid Corporation has made a lot of money on them.

The foregoing interlinear presentation shows clearly how the writer has simply traveled along with the original text, substituting approximately equivalent terms except where their understanding fails them.

Such a procedure as the one shown in this example has its uses; for one thing, it is valuable for the student's own understanding of the passage; and it may be valuable for the reader as well. How, then, may it be properly used? The procedure is simple. The writer might begin the second sentence with "As Hoffman notes, ……" and conclude the paraphrased passage with a footnote giving the additional identification necessary. Or they might indicate directly the exact nature of what they are doing, in this fashion: "To paraphrase Hoffman's comment..." and conclude also with a footnote indicator.

In point of fact, this source does not particularly lend itself to honest paraphrase. The purpose of paraphrase would be to simplify or throw new and significant light on a text; it requires much skill if it is to be honestly used and should rarely be resorted to by the student except for the purpose, as was suggested above, of personal enlightenment.

10.6 *The "Apt" Term*

The manner with which some substances are able to rotate the plane of polarized light, or optical rotation, is not fully understood. Normal light contains oscillating waves on every plane. "Plane-polarized" light, on the other hand, which was discovered in the early nineteenth century, is made of electric and magnetic fields oscillating on only one plane. Polarizers are the filters that create such special light. These are used today in sunglasses, various airplane windows, and, of course, by the Polaroid Corporation.

Here the writer has not been able to resist the appropriation of two striking terms- "rotate the plane or polarized light" and "the filters that create such special light;" a perfectly proper use of these terms would have required only the addition of a phrase or two: The manner with which some substances are able to, as Hoffman explains, "rotate the plane of polarized light," or optical rotation, is not fully understood... Hoffman goes on to tell how polarizers are "the filters that create such special light."

Other phrases in the text above - "oscillating on only one plane," "oscillating waves on every plane": - are clearly drawn from the original source but are so much matters in the public domain, so to speak that no one could reasonably object to their re-use in this fashion.

Since one of the principle aims of a college education is the development of intellectual honesty, it is obvious that plagiarism is a particularly serious offense, and punishment for it is commensurately severe. What a penalized student suffers can never really be known by anyone but themselves.

11. TEACHING ASSISTANT GUIDELINES

11.1 *Assignment.* A teaching assistant (TA) is assigned to a course by the Laboratory Manager in consultation with the Department Manager and Department Chair. Questionnaires are sent to all eligible graduate students soliciting their preferences. However, the final decision rests with the Laboratory Manager.

11.2 *Responsibilities*. The teaching assistantship is a paid position which entails certain responsibilities. The course supervisor assigns all course-related work to the TA. Failure to fulfill the teaching responsibilities as delineated by the course supervisor is cause for dismissal as a teaching assistant. This may include not only loss of stipend but also loss of guaranteed support and tuition waiver.

11.3 *Consensual Relationships*.

(a) Any amorous dating or sexual relationship while a TA is acting as an instructor, advisor, supervisor, or can exercise any authority over the student, is **impermissible**. Voluntary consent by the student under such circumstances is suspect, given the fundamental nature of the relationship. Moreover, other students may be affected by such behavior because it places the TA in a position to favor or advance one student's interest to the potential detriment of others. In addition to being in violation of University policy, such relationships may lead to defacto sexual harassment and prompt disciplinary action. This policy applies to both male and female TAs and regardless of who initiates the relationship.

(b) In a situation where a student and a TA are more than casual acquaintances, the TA should request that the student be switched to another section in order to avoid any real or apparent conflict of interest.

11.4 *Conflict of interests*.

(a) Since a TA is being paid by the Department to teach, it is improper for a TA to tutor for profit any student for whom the TA has official grading or tutoring responsibility. For example, a TA teaching *Instrumental Analysis* (Chem141) could tutor *Introductory Chemistry* (Chem1) students, whereas it would be improper for a Chem1 TA to tutor any Chem1 students since these TAs have shared responsibility for helping all Chem1 students during their office hours.

12. ETHICAL CONDUCT

All members of the Chemistry Department are required to maintain the highest of ethical standards in all of their research and teaching duties. Two documents which should be consulted are the Tufts University Handbook "*Honesty is the Best Policy*" published by the Dean of Students Office and *"On Being A Scientist - Responsible Conduct in Research"* published by the National Academy Press and available from the Chemistry Department Main Office (Pearson 110) or at http://www.nap.edu/readingroom/books/obas/.

13. APPENDIX

The following forms are contained at the end of the handbook for your use.

- Progress Summary Sheet for Ph.D. Candidates - Checklist for Student Use.
- Form A - Public Study Topic
- Form B - Private Study Topic
- Form C - Original Proposal
- Form D - Department Pre-Approval Form for Transfer of Credit Petition
- Study Topic Evaluation - Committee Member
- Study Topic Evaluation - Faculty Audience Member
- Study Topic Evaluation - General Audience Member

NOTE: Upon completion of the requirement, the respective form must be completed by the student, signed by all the research committee members, and then submitted to the Chair of the Joint Graduate Committee.

The following forms not included here are contained in the "Handbook for Graduate Students" published by the Graduate School of Arts and Sciences:

- Recommendation for Award of M.S. Degree
- Recommendation for Award of Ph.D. Degree
- Request for Leave of Absence or Extension of Time
- Petition for Transfer of Credit
- Transcript Request for Petition of Transfer of Credit
- Approval of Thesis/Dissertation for Binding
- Certificate of Fitness
- Change of / Address / Name / Advisor

The Graduate School of Arts and Sciences forms should be completed by the student and submitted to the Joint Graduate Committee Chair. The forms will then be returned to the student who should forwarded them to the Graduate School.

PROGRESS SUMMARY SHEET (Biochemistry Ph.D. Candidates)

Name_____ Semester Enrolled_____

Research Advisor_____

REQUIREMENT	COMPLETION DATE	STATUS
1) Core Courses (Sec. 3.2a)	End of 3rd academic semester.	Organic` ☐ Chem 171 ☐ Chem 172 ☐ BIO105 ☐ Analytical/Physical/Inorg ☐
2) Course "Professional Skills in Chemical Research"	End of 2nd academic semester	
3) Summer Research report (1-2 pp, signed by Research Advisor)	End of the 1st summer	
4) Research Committee (In addition to Advisor)	At selection of study topic.	2)_____ 3)_____
5) Graduate Course Work (Two minimum in addition to core requirement)	End of 4th academic semester.	☐ ☐
6) Study Topic (Public)	Before the end of 4th semester.	☐
7) Study Topic (Private)	Before the end of 4th semester.	☐
8) Teaching	Anytime	☐
9) Original Proposal	No later than end of 8th semester	☐
10) Written Thesis	No less that two weeks prior to oral defense.	☐ Copy submitted to each examination committee member.
11) Thesis Defense		☐ ☺

FORM A

Public Study Topic

_____ **has completed the written**

(Name)

and presented study topic on _____ **entitled**

(Date)

_____

_____

☐ **Attempted**

☐ **Passed**

Research Committee Signatures:

_____

(Research Advisor)

_____ _____

(Committee Member) **Committee Member)**

After completion of the Public Study Topic presentation and oral exam, this Form must be completed by the student, signed by Committee Members and returned to Debbie D'Andrea

FORM B

Private Study Topic

_____ **has completed the written**

(Name)

and presented study topic on _____entitled

(Date)

_____

_____

☐ **Attempted**

☐ **Passed**

Research Committee Signatures:

_____

(Research Advisor)

_____ _____

(Committee Member) **Committee Member)**

After completion of the Public Study Topic presentation and oral exam, this Form must be completed by the student, signed by Committee Members and returned to Debbie D'Andrea

FORM C

Original Proposal

_____ **has completed the written**

(Name)

and presented original proposal on _____entitled

(Date)

_____

_____

☐ **Attempted**

☐ **Passed**

Research Committee Signatures:

_____

(Research Advisor)

_____ _____

(Committee Member) **Committee Member)**

After completion of the Public Study Topic presentation and oral exam, this Form must be completed by the student, signed by Committee Members and returned to Debbie D'Andrea

FORM D

Department Pre-Approval Form for Transfer of Credit Petition

Please fill out the top part of this form and then file it with any member of the JGC. The course syllabus and description, as well as a completed Tufts Graduate School Transfer of Credit Form (available in the Graduate Student Handbook at: http://ase.tufts.edu/gradstudy/GSAShdbk.pdf) must accompany this form. Please use a separate Form D for each course.

To be filled out by student:

Today's date:

Student:

Course number and title:

Date course taken (semester/year):

Where course was taken:

For Tufts Chemistry/Biotechnology JGC use:

Tufts equivalent course (if any):

- ❑ This course satisfies the Core Requirement in: _____
- ❑ This course does not satisfy a Core Requirement but may be counted toward the Course Requirement.
- ❑ This course may not be used toward an advanced degree in Chemistry/Biotechnology at Tufts.

Signature of Tufts Instructor (if applicable) _____

Signature of JGC Representative _____

Signature of Department Chair _____

Study Topic Committee Member Evaluation Speaker: _____ Date: _____

The following points are identified in the Department's Academic Requirements and Procedures Handbook as the minimum requirements that must be met to complete successfully the study topic requirement. Failure to meet any one of these requirements, as determined by a majority of the student's faculty committee, will result in failure of the study topic attempt.

Public Seminar:

1) Presentation was sufficiently detailed and reflected a graduate-level understanding of the material.	☐Yes ☐No
2) Presentation was aimed at a chemically educated general audience.	☐Yes ☐No
3) Formal presentation was of adequate length (>45 minutes, ideally 50 minutes).	☐Yes ☐No
4) Oral presentation and responses to questions were sufficiently lucid.	☐Yes ☐No
Comments:	

General Guidelines

1) Presenter demonstrated an adequate knowledge of subject matter.	☐Yes ☐No
2) Presenter displayed familiarity with relevant experimental or computational methods.	☐Yes ☐No
3) Presenter could place study topic in broader context of the field. (Demonstrated awareness of related techniques; Able to evaluate and compare them.)	☐Yes ☐No
4) Presenter was able to explain sufficiently any words, formulas, or concepts presented.	☐Yes ☐No
Comments:	

Written Report

1) Report was prepared with adequate attention to style, clarity and organization.	☐Yes ☐No
2) Material obtained from the literature (Tables, Figures, Data, …) was properly cited.	☐Yes ☐No
3) The study topic was drawn primarily from the primary literature and not principally from review literature.	☐Yes ☐No
4) The study topic demonstrated a sufficient synthesis of ideas and critical analysis of the topic.	☐Yes ☐No
Comments:	

Signed: _____ Date: _____

Study Topic Evaluation **Speaker:** _____ **Date:** _____
Faculty Audience Member

Introduction: How well did the presenter introduce:	Very Well…				Very Poorly
1) The subject matter of the talk?	1	2	3	4	5
2) The reasons for choosing the topic and its scientific and/or technological importance.	1	2	3	4	5
3) The "prior art", i.e., what has been done before and what is currently considered state-of-the-art?	1	2	3	4	5
4) Oral presentation and responses to questions were lucid.	1	2	3	4	5
Comments:					

Body:			
1) Did the level of presentation assume too much or too little knowledge by the audience?	Too Much	About Right	Too Little
2) Were there scientific or technical inaccuracies in the material presented? *	Many	Few	None
3) Were unfamiliar terms, and concepts, and ideas clearly defined/explained without excessive use of jargon? *	Always	Most of the time	Rarely
4) Did the talk follow a logical order?	☐Yes ☐No		
5) Did the presenter speak clearly and audibly?	☐Yes ☐No		
6) Were visual aids clearly readable?	☐Yes ☐No		
7) Were there any points that you felt the speaker explained particularly well? If so, what were they?			
8) Were there any points that you felt the speaker explained particularly poorly? If so, what were they?			
Comments (including examples of * items)			

Conclusion:	
1) Did the speaker adequately summarize the topic and its scientific significance?	☐Yes ☐No

Summary:					
Rate the overall quality of the presentation:	Excellent	Very Good	Good	Fair	Poor

Evaluator: _____

The following points are identified in the Department's Academic Requirements and Procedures Handbook as the minimum requirements that must be met to complete successfully the study topic requirement. Failure to meet any one of these requirements, as determined by a majority of the student's faculty committee, will result in failure of the study topic attempt.

Public Seminar:

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2) Presentation was aimed at a chemically educated general audience.	☐Yes ☐No
3) Formal presentation was of adequate length (>45 minutes, ideally 50 minutes).	☐Yes ☐No
4) Oral presentation and responses to questions were sufficiently lucid.	☐Yes ☐No
Comments:	

General Guidelines

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2) Presenter displayed familiarity with relevant experimental or computational methods.	☐Yes ☐No
3) Presenter could place study topic in broader context of the field. (Demonstrated awareness of related techniques; Able to evaluate and compare them.)	☐Yes ☐No
4) Presenter was able to explain sufficiently any words, formulas, or concepts presented.	☐Yes ☐No
Comments:	

Study Topic Evaluation **Speaker: _____** **Date: _____**
General Audience Member

Introduction: How well did the presenter introduce:	Very Well…				Very Poorly
1) The subject matter of the talk?	1	2	3	4	5
2) The reasons for choosing the topic and its scientific and/or technological importance.	1	2	3	4	5
3) The "prior art", i.e., what has been done before and what is currently considered state-of-the-art?	1	2	3	4	5
4) Oral presentation and responses to questions were lucid.	1	2	3	4	5
Comments:					

Body:			
1) Did the level of presentation assume too much or too little knowledge by the audience?	Too Much	About Right	Too Little
2) Were there scientific or technical inaccuracies in the material presented? *	Many	Few	None
3) Were unfamiliar terms, and concepts, and ideas clearly defined/explained without excessive use of jargon? *	Always	Most of the time	Rarely
4) Did the talk follow a logical order?	☐Yes ☐No		
5) Did the presenter speak clearly and audibly?	☐Yes ☐No		
6) Were visual aids clearly readable?	☐Yes ☐No		
7) Were there any points that you felt the speaker explained particularly well? If so, what were they?			
8) Were there any points that you felt the speaker explained particularly poorly? If so, what were they?			
Comments (including examples of * items)			

Conclusion:	
1) Did the speaker adequately summarize the topic and its scientific significance?	☐Yes ☐No

Summary:					
Rate the overall quality of the presentation:	Excellent	Very Good	Good	Fair	Poor

The following points are identified in the Department's Academic Requirements and Procedures Handbook as the minimum requirements that must be met to complete successfully the study topic requirement. Failure to meet any one of these requirements, as determined by a majority of the student's faculty committee, will result in failure of the study topic attempt.

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4) Oral presentation and responses to questions were sufficiently lucid.	☐Yes ☐No
Comments:	

General Guidelines

1) Presenter demonstrated an adequate knowledge of subject matter.	☐Yes ☐No
2) Presenter displayed familiarity with relevant experimental or computational methods.	☐Yes ☐No
3) Presenter could place study topic in broader context of the field. (Demonstrated awareness of related techniques; Able to evaluate and compare them.)	☐Yes ☐No
4) Presenter was able to explain sufficiently any words, formulas, or concepts presented.	☐Yes ☐No
Comments:	