

# **TEACHING ASSISTANT MANUAL**

*Department of Physics*

*New Mexico State University*

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## TO THE GRADUATE TEACHING ASSISTANT

One of the principal goals of the department is to provide excellent undergraduate instruction in physics. Our graduate Teaching Assistants (TAs) play a significant role in our progress toward this goal.

Our undergraduate students learn in many different ways, including

- Traditional delivery (lecture)
- Demonstrations
- Homework assignments
- Supplemental instruction (recitation)
- Laboratory
- One-on-one tutoring
- Problem-solving in small groups (moderated or independent)

Our graduate teaching assistants (TAs) assist in this learning process in several different ways, especially as

- Lab instructors
- Graders for homework problems
- Lecturers in introductory courses
- Tutors in the tutoring room
- Lab or demonstration setup
- Learning assistants

Other duties may be assigned by the Department Head or the course instructors as needed.

While being a TA is a lot of work (~20 hours a week), I firmly believe that a TA assignment contributes substantially to the professional development of each graduate student. Our TAs can build leadership behaviors, especially communication, teamwork, ethics, planning and milestones, and working with people in an interdisciplinary environment. Therefore, this department will usually require that all of our students have TA assignments for at least two years after coming to NMSU.

We believe that laboratory is an important part of undergraduate instruction in physics. Students frequently comment that it is in the laboratory that they really begin to understand what their lecture professor is trying to tell them. We think that laboratory experience can help students develop not only measurement skills but also analytical and communication skills.

This handbook has been developed to assist you in the performance of your TA duties. In it you will find descriptions of TA duties, specific information about training and orientation, and other pertinent information about departmental organizations.

Stefan Zollner  
Department Head

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# TEACHING ASSISTANT MANUAL

## I. GENERAL INFORMATION ABOUT YOUR ASSISTANTSHIP

### A. *Appointment*

Your Graduate Teaching Assistantship (TA) appointment is made for one academic year or for a single semester. The assistantship is renewable, dependent upon performance, progress in your graduate physics program (GPA, exams, research), successful completion of duties, and availability of funds. **(We are in the midst of developing a process of documenting performance for graduate assistants, similar to faculty and staff.** The resulting performance ratings will be taken into account for future appointment decisions.) The amount of your assistantship is stated in your appointment letter. Personnel forms are to be completed immediately upon your arrival to the campus. Ms. Loretta J. Chavez (GN 221) will provide you with information about payroll and tax forms and issue you keys and/or proximity cards. You are paid on a semi-monthly basis (nine paychecks per semester, last working day of each month) and you can pick up your paychecks from Ms. Chavez or Ms. Alexander in GN 221. There is a delay of two weeks for each check, that is, your first check will not arrive until one month after you start. You may also elect to have your paychecks directly deposited into your bank or credit union; direct deposit arrangements can be made at the Payroll Office in Hadley Hall. Teaching duties will vary and are assigned by the Department Head on a case-by-case basis. Teaching assistants are required to attend all orientation and training meetings designated for TAs.

### B. *Renewal*

Requests for renewal of teaching assistantships are made near the close of the spring semester (unless your appointment is for the fall semester only). The renewal decision is made depending upon your previous performance, progress in your graduate physics program, successful completion of duties, and availability of funds. More advanced students (who have completed all or most of their coursework) are usually expected to seek research assistantships (in physics or in other departments) to support them during the research phase of their graduate studies.

### C. *Summer Employment*

Requests for summer employment are also made near the close of the spring semester directly to the Department Head. Awards are based on availability of positions and are made based on performance. A summer TA assignment generally consists of teaching laboratories or lecture courses and possibly grading homework, for a nominal 10-20 hours per week. The department will assist as much as it can with other summer placement if you make your wishes known as early as possible. The number of TA positions during the summer is much smaller than during the academic year. All students are encouraged to seek research assistantships during the summer.

### D. *Mail and Local Address*

Each TA must have a local contact address, an NMSU e-mail address, and a phone number on file in the Physics Office. Office space assignments are made by the department office, and you will be assigned a mailbox in GN224. Please do not switch your desk space without approval from the Department Office. Free e-mail accounts are available to all NMSU students; go to

<http://accounts.nmsu.edu/>. Do not use non-NMSU email addresses. PLEASE CHECK YOUR MAIL BOX AND E-MAIL DAILY. These are the primary ways we can get important messages to you.

## **II. BEING A TA IN THE PHYSICS DEPARTMENT**

### ***A. Selection of TAs***

The TAs in the department are generally selected from the pool of physics graduate students. Most new physics graduate students are TAs for at least one year, unless specific arrangements have been made to work on a Research Assistantship (RA). Very few graduate students remain TAs during their entire graduate careers, since our TA funds are limited. (All new students should seek to find a physics Ph.D. advisor, who will support their research with a research assistantship.) Occasionally, some TAs are undergraduate physics students or graduate students in physics-related disciplines.

### ***B. TA assignments and duties***

The primary assignments are usually a combination of undergraduate laboratory instruction, tutoring, and grading. The detailed duties are determined by the instructor of the course taught or graded or by the tutoring room coordinator. TAs are also expected to keep office hours and be available to their students. Those teaching laboratory sections are required to obtain student evaluations of teaching near the end of the semester. The standard TA assignment is designed to occupy 20 hours per week; the remainder of your time is for your graduate studies. Your assignment is made at the beginning of each semester by the Department. You should contact your assigned supervisor(s) as soon as your assignment is made. University and departmental orientations will be available. The faculty and staff of the department can provide various kinds of assistance and information to you as you begin your duties.

It is important that all our TAs act professionally and treat their students with respect. It is best to keep the relationship on a highly professional level. Conflicts of interest (e.g., a close personal relationship with a physics student) should be disclosed to the department head before course assignments are made or as soon as possible thereafter. NMSU has strict policies regarding use of computers, ethical conduct, smoking, alcohol and drug use, accommodation of disabilities, sexual harassment, racism and discrimination, which lead to disciplinary action in the case of misconduct. If in doubt, ask your course instructor or Department Head.

Satisfactory performance in your teaching and other assigned duties is expected. Accurate and timely record-keeping is important. One responsibility for any teacher is to be on time for every class and meeting. Should you find it necessary to miss a laboratory because of illnesses or other reason, it is your responsibility to make arrangements to have your class covered by another capable person. Once you have made these arrangements, you must inform the faculty member in charge and a department secretary about the changes. If you are unable to make arrangements for coverage, it is imperative that you inform the faculty member supervising your class or a department secretary if you cannot reach the faculty member. It is a good idea to make arrangements at the beginning of the semester with another TA who would be able to fill in for you on short notice.

Tardiness to labs creates an especially serious problem. If you know you will be a few minutes late, please call the departmental office (646-3831) so that your classroom may be opened and

the students informed about your late arrival, so they will not leave before you arrive.

### ***C. Undergraduate Courses***

The following descriptions will familiarize you with some of the undergraduate courses that will comprise most of your teaching duties:

PHYS 110G – General education course: introduction to physics.

PHYS 120G – General education course: introduction to acoustics, often taken by music majors.

PHYS 211/212 – Non-calculus sophomore-level treatment of mechanics, heat, sound, electricity and magnetism, and optics; for non-technical majors.

PHYS 213 – Calculus-based mechanics; for science majors and some engineers.

PHYS 214 – Calculus-based electricity and magnetism; for science majors and some engineers.

PHYS 215/216 – Calculus-based sophomore-level treatment of mechanics, electricity and magnetism, and optics; for engineering and other technical majors.

PHYS 217 – Calculus-based heat, light and sound; for science majors and some engineers.

PHYS 315 – Modern physics.

PHYS 370 – Geometrical optics.

PHYS 471 – Modern experimental optics.

PHYS 475/575 – Advanced modern physics laboratory for upper-division undergraduate and graduate students.

### ***D. Orientation and Training Program***

Orientation is primarily done by the instructor supervising the TA. Those teaching laboratories receive orientation during the weekly laboratory course meetings. Course graders receive instruction from the professor teaching the course. Graduate students should interact with these faculty members. All TA's must also attend the NMSU graduate student orientation. In addition foreign students must pass an English exam before they can serve as a TA.

### ***E. Faculty and Staff Assistance***

1. Faculty. The faculty members maintain an interest in not only your academic success, but also your success as a teaching assistant. Each course you are assigned will have a faculty member designated as the instructor, who will be your direct supervisor. You will meet with this faculty member frequently for discussions of how the laboratory is to be handled, and you should go to this faculty member when questions or problems arise. Suggestions and feedback are encouraged. With open lines of communication between faculty and TAs, undergraduate students receive better instruction. For many labs, Ms. Chris Pennise is the faculty instructor.

#### 2. Support Personnel.

a. Instructional Support Coordinator. Ms. Chris Pennise in GN 207 provides support to the TAs in the teaching labs. She can assist you with some of the “nuts and bolts” of your day-to-day teaching activities and is available to assist in setting up the laboratory experiments and in keeping the apparatus functional. You must notify the ISC promptly whenever any piece of laboratory apparatus is not working.

b. Secretaries. The Department secretary (Loretta J. Chavez) in Gardiner Hall GN 221 can provide help with reproduction of teaching material and examinations. You can also ask

- her about your paychecks or the hiring process.
- c. Financial. Ms. Josie Alexander in Gardiner Hall GN 222 is the department's financial manager. She can often answer questions on this subject.
  - d. Computer support. Tarek Tawalbeh and Brandon Calabro provide support of instructional computers.

### III. GUIDELINES FOR LABORATORY INSTRUCTION

#### A. *General*

The results of most formal research on the effectiveness of laboratory instruction in increasing students learning are ambiguous, but some useful ideas are presented in the document *Goals of the Introductory Physics Laboratory*, prepared by the American Association of Physics Teachers Committee on Laboratories; excerpts from this are given in Appendix B. We at NMSU believe that laboratory is a successful and necessary part of undergraduate instruction in physics. We feel that laboratory skills can help students develop measurement and communication skills, as well as an improved understanding of physics, if the lab is well designed, proper instruction is provided, and thoughtful evaluation of the student's work is given.

Laboratory is one of the few one-on-one contacts that undergraduate students have with a college teacher. The direct student-teacher interaction can be one of the most rewarding experiences of college life. The attitude and skill of the instructor affect the quality of the laboratory instruction more than anything else. Students may overlook equipment that isn't working properly, but they won't overlook the ill-prepared teacher or the teacher with a negative attitude.

#### B. *Lab Overview*

Laboratory sections generally meet once a week for 2-1/2 hours during the fall and spring terms. You will receive a copy of the lab manual and the hours of the lab sections for which you will be responsible. All students must have a copy of the lab manual - check for this at the first lab period. You should see that they have a copy of the schedule of experiments to be done. The important aspects of lab instruction must be given to the students in the form of a written syllabus by the course instructor at this time. This should include information on grading, absence policies, make-up policies, final exams, weeks when lab is not scheduled because of holidays, and the lab rooms where the students will meet. Because of space and equipment limitations, the labs may be switched between rooms on occasion.

#### C. *TA Responsibilities*

##### BEFORE THE LABORATORY BEGINS:

1. Perform the entire lab experiment yourself if you haven't done it before. Make notes on problems you encounter and inform your students of them (they will appreciate the fact that you have taken the time to do the lab as outlined in the lab manual).
2. Prepare a lesson plan for the lab class. Good lesson plans will have introductory remarks,

notes about particular physical concept being examined, and reminders about safety and special features of lab apparatus. It may be appropriate to cover a few interesting points about the “everyday” aspects of the physical concepts illustrated by the lab.

3. Review with the students the evaluation scheme for grading the lab reports, the time allowed for their completion, and turn-in procedures. Grading schemes should be discussed with the faculty lab supervisor before presenting them to the students, as we want to standardize the lab sections for the same course number insofar as possible.
4. Arrive at the lab a few minutes early to check out the apparatus and to let students into the room. This will give you and the students a chance to get organized before beginning the lab period.

#### DURING THE LABORATORY INSTRUCTION PERIOD:

5. Begin the lab on time. Start with a well-prepared description of the experiment to done.
6. Interact with the students.
7. Circulate among the work groups. Become aware of what is going on. If problems with the apparatus occur during lab, seek assistance from the Instructional Support Coordinator in Gardiner Hall Room 207.

#### AFTER THE LABORATORY:

8. Report inoperative apparatus to the Instructional Support Coordinator promptly. Be very specific about the problems.
9. Grade reports before the NEXT laboratory meeting.
10. When leaving the lab room, check to see that the lab is in good order for the next lab (this includes cleaning the board).
11. Check to see that no laboratory equipment is missing.

#### ***D. Laboratory Report Format***

Many laboratories require lab reports. The format is specified by the faculty member in charge of the lab, but a common format is described below.

It is suggested that lab reports be made in a hardbound quad paper notebook. This means that students will have all their lab reports together should the need arise to review them (such as for the lab final exam). The essential elements of a lab report include:

1. Title of Experiment
2. List of Lab Partners
3. Objectives
4. Theory
5. Experimental procedure
6. Data collected
7. Analysis of data
8. Results
9. Conclusions

Some of these may be combined or presented in special manners (for example, data and analysis

in one single table; or results in the form of a graph). The SI unit system generally should be used throughout the report.

The report is not supposed to be primarily a writing exercise, although it is expected that good English usage will be followed, with correct spelling, complete sentences, good grammar, and conciseness. Each report should be completely identified with the student's name, course, section, and experiment title. The first part may be an abstract (a summary of what was done and the final results), which probably should be the last thing written. All data must be identified with correct units, and the correct number of significant figures must be used. The results should be compared with the expected values, when possible, and error estimates on the data should be made.

### ***E. Reporting Laboratory Grades***

It is your responsibility to grade each week's lab reports. Some lab supervisors want a certain standard for the grade assignments in order to insure uniformity among the different sections. Check with the supervisor at the beginning of the semester so that you can better instruct your students on the system you will follow in grading the lab reports. Final grades may be assigned by you alone, by you with the supervisor's concurrence, or by the supervisor. Again check early for the policy you should follow. Be sure the students are given the rules for grading at the start of the course.

### ***F. Final Exam***

In many laboratories a final exam is given. The supervisor of the lab will give you the instructions for this. You should tell the students the rules for the final exam, and its weight in the final grade, at the start of the semester.

### ***G. Laboratory Manual***

At the end of the semester you should return your copy of the lab manual to the department office.

## **IV. GRADING ASSIGNMENTS**

Some TAs will be given assignments to grade homework in physics courses instead of, or in addition to, teaching labs. Grading assignments will be made at the beginning of each semester.

The faculty member to whom you are assigned may have specific requests related to his grading policy that you will need to fulfill. It is the responsibility of the TA to contact the appropriate lecturer or lab coordinator for specific grading instructions. A few general suggestions about grading are as follows:

- A. Treat the student with respect. Do not write comments such as "You fudged here" or "Stupid Mistake."
- B. Emphasize the proper use of units, labeling of axes in graphs, and careful drawing of diagrams.
- C. Emphasize the need to check answers to problems for reasonableness. That is, the student should show that dimensions and units are correct; that limiting cases for which

- the answer is obvious are correctly given by the student's solution, etc. This implies an emphasis on algebra rather than numerical plug-in during the working of problems.
- D. The student should always show his work. A simple statement of the numerical answer to a problem should be given little, if any, credit.
  - E. The student should always know the basis of the grade you give.

## **V. GUIDELINES FOR INSTRUCTION IN THE TUTORING ROOM**

### ***A. General***

Some TAs will be assigned to staff the departmental physics tutoring room. The educational intent of the tutoring room is to provide an additional learning opportunity for undergraduate students, primarily in the introductory courses, as they learn to apply physics. During the opening hours of the tutoring room, students drop in and work on assignments from their course instructor or seek help with their individual learning difficulties. The role of the tutors is to foster a safe, supportive and cooperative environment that promotes the independence of the learner.

In order to most effectively serve the students, TAs nominally staff the tutoring room in the two days before a homework assignment is due for the class in which they are a TA. However, depending on enrollment and usage patterns, TAs from any course can be assigned to any of the available times. While a TA may not be immediately familiar with the material from a course other than their own, they are expected to help all students on a "best efforts" basis.

### ***B. Designing the Learning Opportunities***

Typically the students come to the tutoring room to work on specific problems, practice techniques or get questions answered. The role of the tutors is to guide them in that process rather than to provide solutions. Here are some suggestions on how to achieve that:

- A. Ask the student guiding questions rather than giving a straight answer.
- B. If the student does not know "how to get started" help them extract information or clues from the problem statement, and focus on the process of selecting the appropriate physical concepts.
- C. Have students repeat the task or ask the question in their own words, so you can check their understanding.
- D. Guide students away from "hunting for the right equation" to thinking about the physical concepts and how they are related.
- E. Emphasize and model the use of visual tools (e.g. sketches, diagrams) when setting up the problem.
- F. Show students how to use their textbooks or course material to find information (data, examples, equations), so that they over time become more independent of the teacher.

G. Insist on the proper use of units, attention to unit conversions and labeling of diagrams or axes of graphs.

H. Focus the attention of the student on the problem solving process, not so much the specific numerical answer. Emphasize the need to show the problem solving steps, so others can follow them.

I. Show students how mathematics can be used to solve the problems (questions on purely mathematical difficulties should be taken to the Mathematical Sciences Department and/or the Math Success Center in Walden Hall, Room 101).

J. When trying to find an error in student work, model how you can use self-checks such as limiting cases or dimensional analysis to detect possible mistakes.

K. Encourage students to reflect if their answer makes sense or what they learn and how they learned it.

L. It is understood that you may not know how to solve every problem presented to you while tutoring. When this occurs, let the student know that you will need some extra time to work on a solution. You may need to ask the student to come back at a later time.

### ***C. Creating a Safe and Supportive Environment***

Most people learn better when they feel it is safe to try something new and unfamiliar and see mistakes as learning opportunities rather than fearing to look stupid. It is therefore extremely important that you as tutor always treat the student with respect and understanding that learning physics includes some struggling with ideas or methods. It is also recommended that discussions in the physics tutoring room should be limited to physics and avoid personal topics, because this might be misinterpreted by the student.

Also, as with any one-on-one interaction, please be aware and respectful of an individual's personal space. Tutors should always keep around 6 inches between you and a student, in order to ensure the student feels comfortable during the tutoring session. At no time should you feel it necessary to touch the student in any way (e.g. a pat on the back for a job well done). Tutors, as all teaching assistants, are representatives of the Physics Department and should act in a professional manner when interacting with students.

### ***D. Other Expectations***

As a teaching assistant in the tutoring room you are expected to

- A. attend any and all orientations, trainings, and meetings as designated by the Physics Department and/or the faculty in charge of the tutoring room.
- B. be present during your assigned tutoring hours. The tutoring room should open on time and together with your fellow tutors the tutoring room needs to be staffed for the entire posted tutoring hours.
- C. identify yourself as a tutor, so that students know whom to approach for assistance.
- D. act in a professional manner as a representative of the Physics Department.

- E. never leave the tutoring room unattended; help safeguard textbooks and equipment. Lock the room outside of tutoring hours.
- F. make arrangements for a substitute in case you are ill or otherwise unavailable. Inform a departmental secretary about these changes.
- G. sign the sign-in sheet with the times you arrive and leave, plus the average number of students seeking assistance in the tutoring room during your assigned hour.
- H. inform the faculty in charge of the tutoring room when anything out of the ordinary occurs or when you have concerns. For example: a hostile student, finding the room unlocked and unattended when you arrive, missing textbooks or equipment, etc.

### ***E. Other Student Resources***

An additional University-wide resource for students is the Student Success Center (the “Z”) in Zuhl Library run by the Division for Student Success. This center offers both face-to-face and on-line tutoring. These are undergraduate tutors in various subjects who have mastered the content areas in which they tutor. A schedule is posted on the main Student Success Center – Zuhl webpage (<http://ssc.nmsu.edu/zuhl/tutoring/index.html>).

This program is **completely independent** of our Physics Tutoring Center and Physics TA’s do not participate. You should, however, be aware of this resource for your students.

## **VI. FULFILLING YOUR DUTIES**

As a TA you are a valued part of the instructional staff of the Physics Department. Your performance reflects not only on you as an individual, but also on the department as a whole. The faculty views you as a colleague in our departmental effort to provide the best possible instruction to our undergraduate students. The faculty also does not want you to be overworked, because your primary reason for being here is to obtain an advanced degree. You are assigned a certain number of hours per week for each of your assignments, and the time you spend on each of them should be consistent with that assignment.

### ***A. Failure to meet your responsibilities***

If you fail to meet your responsibilities as a TA in a satisfactory manner, then the following may result:

1. Informal Contact. You will be contacted by the faculty supervisor to discuss the problems related to your performance of duties. If the problem is corrected, no further discussion will ensue.
2. Formal Contact. The faculty supervisor will contact you in writing about the problem or problems related to your performance of duties. Copies of the formal contact are sent to the Department Head, and if warranted, to the NMSU Graduate Administrator. A meeting will be called by the Department Head and other appropriate faculty to discuss the procedures for correcting the problem. This meeting will be followed up with a letter to the TA detailing the correction procedure.
3. Formal Action. If the problem is not corrected as outlined in the formal contact meeting,

one of several actions may be taken by the department. These could include reduction in salary for absences from teaching duties (for a problem related to non-performance of teaching duties), temporary dismissal from duties, or permanent dismissed from duties. You can be assured that formal action is taken only after discussions and warnings have taken place (except in cases of serious misconduct).

### **B. TA Assignment Hours**

A laboratory session generally counts as 6-7 hours. Others, such as grading, are variable, depending partly on the number of students in the class. The total of these hours should be 20 hours per week for a standard TA.

If you find that you must spend more than the proper number of work hours per week to perform your assigned duties satisfactorily, then you should first request your supervising faculty member to reduce your assignment(s) appropriately. If this does not help, or if for any reason you do not wish to make this request to your supervisor, then you should contact the Department Head.

## **VII. TA EVALUATION**

The TA is evaluated primarily by the faculty members to whom the TA is assigned for teaching and grading duties. Faculty evaluations are based on observations made during drop-in visits or scheduled visits to the labs and the performance by the TA in other assigned duties. This type of evaluation is intended to be informal and is aimed at providing constructive information to the TA about his/her performance.

The TA must also hand out the standard *DEPARTMENT TEACHING EVALUATION SHEETS* to each student in the assigned labs two weeks before the end of the semester. Original sheets must be used. DO NOT use copies made on the photocopier. These should be passed out to the students, picked up, and taken to the department office by someone other than the instructor (such as another TA). The instructor should not be in the room during the evaluation. These completed evaluations are then given to the Department Head, who may call the TA in for a discussion concerning the student comments. They will be given to the TA after the grades are turned in.

## **VIII. COMPUTER FACILITIES**

Our newer labs use the PASCO Data Studio software running on IBM PC's. More information on each can be obtained from the Instructional Support Coordinator. Each TA who is in charge of a lab that uses these should take the time to familiarize himself/herself with the computers and software so that unnecessary problems can be avoided.

You should report problems with the computer equipment or software immediately to the Instructional Support Coordinator in Gardiner Hall Room 207, phone 646-4906 or Mr. Tarek Tawalbeh, tawalbeh@nmsu.edu. Please include the errant behavior in the report in order to allow for quicker diagnosis and repair.

## **APPENDIX A: INSTRUCTIONAL SUPPORT APPARATUS**

### **1. LABORATORY ROOMS**

PHYS 110G – Gardiner Hall GN 104

PHYS 120G – Gardiner Hall GN 206

PHYS 150 - Gardiner Hall GN 264

PHYS 211L, 213L & 215L - Gardiner Hall GN 204

PHYS 212L & 216L - Gardiner Hall GN 108

PHYS 217L – Gardiner Hall GN 206

PHYS 315L – Gardiner Hall GN 132

Tutoring – Gardiner Hall GN ???

### **2. APPARATUS STORAGE**

The storage plan for the department includes the use of rooms GN 106, GN 205, GN 209 and GN 231 for the storage of apparatus used in support of the lectures and instructional labs. We make every effort to keep the storage areas between the labs on each floor free of apparatus that is not specifically designated to be used in support of the undergraduate labs.

### **3. APPARATUS MAINTENANCE**

Damaged or broken (or otherwise non-functional) equipment must be reported to the Instructional Support Coordinator (Room GN 207).

### **4. KEYS AND ACCESS**

A key for admission to the storerooms and laboratories will be checked out from Ms. Loretta J. Chavez by each TA for the semester. You should return the key to Ms. Loretta J. Chavez when your duties as a TA are completed.

### **5. REPLACEMENT APPARATUS**

Toward the end of each semester, each TA should consider his experience with the instructional labs and prepare recommendations for improvement of apparatus and/or facilities. These recommendations can be submitted informally, but in writing, to your faculty supervisor or the Instructional Support Coordinator in Gardiner Hall Room GN 207.