

MATHEMATICS GRADUATE STUDENT TEACHING ASSISTANT MANUAL



Faculty of Mathematics

MATHEMATICS GRADUATE OFFICE University of Waterloo, Waterloo, ON, N2L3G1

Forward

Former graduate students Dave Bigelow, Alice Metzlar, and Dimpy Pathria under the direction of Associate Dean Bruce Richmond produced the original version of this Teaching Assistant Manual in 1988.

The manual has undergone several revisions over the years. In 1994, in light of increasing concerns about improving the quality of TAs, a major revision was undertaken by graduate student Herb Kunze in consultation with Byron Weber Becker, Lecturer in Computer Science and with Professor John Wainwright, Associate Dean for Undergraduate Studies.

It is our hope that future Teaching Assistants will find this material helpful as they prepare to carry out their TA duties. Comments and/or suggestions regarding this TA Manual are welcome and should be directed by e-mail to mgo@uwaterloo.ca.

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1 Introduction

This manual briefly describes the role of Teaching Assistants (TAs) in the Faculty of Mathematics. It attempts to provide practical advice to TAs and to answer some common concerns about administrative aspects and duties.

Effective TAs play an essential role in the teaching process. TAs in the Math Faculty primarily assist course instructors by tutoring, marking, and proctoring. They answer student questions, help solve problems, and provide feedback. Being a TA benefits a graduate student by providing experience in leading individuals, communicating knowledge, and teaching students, and by providing financial support. Learning to be an effective TA is an important part of your graduate education and experience.

The guidelines for tutoring and marking (Sections 3.2 and 3.4, respectively) reflect the typical experience of Math graduate students. We urge you to read them carefully.

2 Administrative Details

Please review the following link to the University Policy for “Guidelines on Graduate Student Support,” which you were notified about during admission: <https://uwaterloo.ca/graduate-studies-postdoctoral-affairs/faculty-and-staff/guidelines-graduate-student-support>. This link provides information regarding financial support; graduate student employment, duties, rates of pay; etc.

2.1 Terms of Employment as a TA

One TA unit requires an average of five hours of work per week for a total of 80 hours per academic term. The 80 hours you spend as a TA include (but are not limited to) the following responsibilities: marking, answering emails, holding office hours, proctoring midterms and exams, pool proctoring, etc. Please note that 76.5 hours is dedicated to the majority of your TA duties and the remainder (3.5 hours) is dedicated to pool proctoring (please see below 3.6.1. Math Faculty Pool Proctoring). **Time needed to learn course material is not included in these hours**, unless otherwise stated by your instructor. TA duties begin on the first day of classes and ends when the grades for the course have been submitted, where TAs are expected to be available during the entirety of this time period. In general, the duties will not be distributed uniformly throughout the term and a TA’s responsibility will vary widely between students, course, instructors, units, etc.

There are restrictions on how many hours a full-time student may work on campus. Please see GSPA’s guidelines for graduate student support for additional information: <https://uwaterloo.ca/graduate-studies-postdoctoral-affairs/faculty-and-staff/guidelines-graduate-student-support>.

Some scholarships place restrictions on the number of TA units a student may accept per year. For example, holders of NSERC Post-Graduate Scholarships are not permitted to spend more than 450 hours per year on such duties. Please talk to your Department/School Graduate Coordinator for more details: <https://uwaterloo.ca/math/current-graduate-students#contacts>.

If you are a Visa student, it is essential to supply your Graduate Coordinator with a copy of your valid Study Permit.

2.2 Getting Paid as a TA

The TA hourly rate is reviewed each year. For the most current compensation rate, please go to <https://uwaterloo.ca/graduate-studies-postdoctoral-affairs/current-students/graduate-teaching-assistantships-ta-and-graduate-research>.

TAs are paid on the last Friday of every month, directly into their bank account. If there is an issue with your TA payment, contact your Department/School Graduate Coordinator:

<https://uwaterloo.ca/math/current-graduate-students#contacts>.

New and returning students that are assigned one or two TA units must complete the appropriate forms in order to be paid. Please refer to the following links and submit the proper documents to your Department/School Graduate Coordinator:

- <https://uwaterloo.ca/human-resources/students/information-graduate-students>
- <https://uwaterloo.ca/human-resources/pay-administration/payroll-forms>

The documents you will need to complete will require your Social Insurance Number, your banking information, and a local mailing address:

- Your Canadian **Social Insurance Number (SIN)**. In order to legally work in Canada, you will require a valid Social Insurance Number. If you do not have one yet, you must apply for one through the Government of Canada at a Service Canada Office. Information on applying for a SIN is available on the Human Resources website at <https://uwaterloo.ca/human-resources/support-new-employees/obtaining-social-insurance-number>. The nearest Service Canada Office is located in Kitchener (<http://www.servicecanada.gc.ca/tbsc-fsco/sc-dsp.jsp?rc=3580&lang=eng#pa>).

Once you have received your SIN, you must inform the University of Waterloo's Department of Human Resources and the Payroll Department as soon as you receive it. You may submit your forms prior to obtaining a SIN, however, the Payroll Department will not release payment until your SIN has been received.

- **Banking Information:** The University of Waterloo will directly deposit your pay into your bank account provided you've given a void cheque and the appropriate forms.
- **Your local mailing address:** The University of Waterloo requires that you provide a Canadian mailing address to which your income tax slips will be mailed. Please do not use the Department or the School address.

You can arrange to pay your tuition out of your monthly TA/RA salary. Guidelines for arranging this are available at the Student Financial Services website: <https://uwaterloo.ca/finance/student-financial-services/how-become-fees-arranged>.

2.3 How TAs are Assigned

In general, most students are assigned to either a faculty course (e.g., MATH####) or a course from their respective units (e.g., STAT####, CO####, etc.). In particular, Computer Science graduate students are almost always assigned to a CS course (e.g., CS####).

Prior to the start of each term (depending on the department/school), students may be given the opportunity to indicate their preference for courses they would like to TA and their respective duties (e.g., marking, writing scripts, giving tutorials, holding office hours, etc.) to their Graduate Coordinators and/or officer and/or chair. The student's preferences, skills, knowledge, qualifications, and previous TA performances are taken into account when students are assigned a course as TAs or as Instructional Apprentices (IA). Individuals that TA for Faculty courses (e.g., MATH####) are assigned by the Math Undergraduate Office. TAs for departmental courses are assigned by the respective units.

3 Teaching Assistant Duties

3.1 Getting Started

The first step in fulfilling your TA obligations is to meet with your TA supervisor, usually the course instructor, to discuss your specific duties. Clarifying your duties early can help prevent miscommunication and avoid any assumptions that can lead to errors.

You should contact your TA supervisor as soon as possible after you are informed of your assignment.

Individuals assigned to TA first and second year Computer Science courses should contact the Instructional Support Coordinator.

During your first meeting with your TA supervisor, you must clarify the following topics (if applicable):

- How does the supervisor want to stay in contact?
- Course content and schedule
 - Get a course outline and any reference materials (course notes, textbooks, solution manuals). Please note that textbooks for faculty courses may be borrowed from the Mathematics Undergraduate Office (MUO) or from your Graduate Coordinator.
 - Scheduled dates for exams and any group marking. Do not schedule any travel plans until after the last day of exams as you may have proctor duties during the examination period and you may also be required to mark final examinations.
- Marking
 - How many assignments are there and what is their deadline?
 - Are assignments done electronically or on paper?
 - How will you receive and return assignments?
 - What is the expected turnaround time?
 - How should you mark presentations?
 - Will the instructor prepare sample solutions and/or the marking scheme?
 - Will sample solutions be posted; if so, by whom?
 - If there are several TAs, how will the work be divided?
 - How should the marks be recorded?
- Tutoring/Office hours
 - How many office hours are expected?

- How many hours are spent in the Tutorial Centre?
- Is participation in a course newsgroup expected?
- Meeting place, time, structure, etc., of tutorials.

It may also be helpful for you to attend the first class of the course to introduce yourself to the students and to get an idea of how the course is taught.

3.2 Tutoring

There are several different types of tutoring environments where you are expected to support undergraduate learning. Examples of different tutoring environments may include a Tutorial Centre, Unix consulting, tutorials, labs, and office hours.

The Math Faculty has a Tutorial Centre for first/second year undergraduate students in which graduate students and upper-year undergraduate students may answer questions on the core and service Algebra and Calculus courses. If you are assigned to one of these courses, you will likely be asked to work regular weekly hours in the appropriate Tutorial Centre. Likewise, Computer Science has a first/second year Consulting Centre and IA's who have a consulting role in their assigned course may also work in the Centre.

Many courses have regular tutorials or labs in which students can work on assignments and ask questions. You may be asked to help with these sessions. Some tutorials will give quizzes to students either in addition to or instead of weekly assignments.

3.3 Office Hours

You may be asked to have office hours during which students can stop by your office and ask you questions. Try to schedule office hours to start during one class period and end during the next class period to minimize time conflicts.

Students primarily use the above tutoring environments for assistance with their assignments. When responding to a student's inquiry, avoid giving the solutions to their assignment. Instead, try guiding the students through their problem set. Ask the student to explain what the question is asking and what they have tried so far. Make sure to have them describe their reasoning. This probing reveals if the student has a conceptual problem, which requires you to talk about the material more generally, or point him/her to the appropriate section of the textbook.

Your teaching style will depend on your personality, but there are some guidelines you should try to follow for either tutorials and office hours:

- Be approachable, enthusiastic, and honest.
- Be prepared. Review the material the students are currently working on. If you think an assignment question is incorrectly stated or ambiguous, see the instructor in advance.
- You should be able to answer all routine questions about the course material. When a student asks a difficult question, allow yourself a minute to think. If a question stumps you, admit it instead of fabricating an answer. Ask the student to return later, or direct the student to the instructor.
- Have the course material handy. Students often come unprepared.

- In a tutorial, don't just sit at the front of the room. Circulate about the room, and if there aren't many questions, approach individual students and ask if they are making progress.
- If many students have questions, don't spend too much time with one person.
- Have the student reword the question, and explain what he/she has done. Encourage the student to ask clean, specific questions.
- Let the student think. Don't give away the main point that renders the problem trivial.
- Answer questions at the level of the student.
- Motivate your approach to the problem. Seeing how somebody with more experience thinks about the problem can be helpful to the student.
- Answer general questions about the course material, but keep in mind that it's not your job to teach the course to students who have missed the lectures.
- In most tutoring situations, you will be talking to students individually. If however, a number of students have the same problem, it may be helpful to use the blackboard. Be sure to write clearly, turn around when speaking, and make sure that all the students in the group are following your explanation. After you have worked out a problem on the board take a step back and look at the board to see if it is clearly presented. If not learn from this and present it more clearly the next time.
- Report widespread problems to the professor so they can be discussed in class.
- Monitor the course newsgroup to stay abreast of problems and solutions discussed there.

Students with general computer-related questions can be sent to the MFCF Help Centre in MC 3017. If you are a CS student, then please refer to <https://cs.uwaterloo.ca/cscf/getting-help> for computer related questions.

3.4 Marking

Assignments and exams are the major source of feedback for both the instructor and the students. The TA should provide feedback and comments regarding how well the students have learned course material. For the instructor, the assignments often indicate how successful the instructor was able to communicate the course material to the students in class.

Some instructors will require that students submit their assignments in the drop boxes on the third or fourth floor of the Mathematics and Computer building (MC). If a late penalty policy has been established, then you will need to ensure that the drop boxes are cleared before each penalty increment. Ensure that boxes are cleared and scan neighbouring ones for stray assignments. If you find an assignment for another course in your box, write the date on it, sign it, and put it in the appropriate box, or turn it in to the TA for that course. Transferring assignments between TA's is best done in person (try their office hours); do not use graduate mail boxes to forward assignments.

If a student has a problem submitting their work, it is the student's responsibility to contact the instructor of the course.

When testing programs, investigate all anomalies – especially when a program fails all of the tests. It may be a bug in your testing procedure, not the student's program.

At the discretion of the instructor(s) involved, you may be asked to mark part of the midterm or final examination for the course.

Your marking style will depend on the instructor's instructions, but here are some general guidelines regarding giving feedback to students and marking strategies:

Feedback to Students

- Mark clearly and neatly. Think about giving constructive wording before you write a comment.
- Examine a student's solution carefully, clearly mark where the student went wrong, and write a short explanation, if necessary. If the student appears to be very confused and you cannot give help in a short comment, then, in such cases writing "Please see the professor or Tutorial Centre," or "Please see the Solutions," as appropriate.
- Avoid ambiguous or cryptic comments or symbols (for example, "??").
- Avoid arrogant or sarcastic comments. Don't forget that the student is a person and should be treated with respect.
- Comments on the paper as a whole, for example, patterns of errors or weakness in the style of presentation, can be especially valuable to students. For example, "review the XYZ Theorem".

Marking Strategies

- Mark consistently. Marking one question at a time on all papers is an effective method to mark consistently between students and to remain focused. Remember to take breaks between questions. It is essential to have a well-defined marking scheme that is applied uniformly throughout.
- A common source of marking errors is when the final answer is correct but the method of solution contains a serious error. It is not enough to simply look at the final answer but the answer must explain clearly how to obtain the correct answer.
- If several TAs are marking the same assignments, lighten the workload by dividing the questions, not the papers, among the markers. This also ensures that all papers will be marked with the same standard.
- Have model solutions available. If it is your job to prepare model solutions, you may find it helpful to first skim the work handed in.
- Ask your instructor how to handle questions with multiple parts. For example, if the solution in one part is done correctly, but uses incorrect inputs from previous parts, should the student be penalized in multiple parts for using the wrong numerical value, but correct methodology?
- If an instructor has prepared model solutions/an answer key, be prepared to assess different solutions that may look very different than the model ones but are still correct.
- If it is your job to create the marking scheme, verify that the marking scheme is consistent between TAs and the instructors. Skim the papers to help you decide whether your proposed scheme is reasonable. Ask the instructor whether some marks should be assigned for presentation.
- Include a comment sheet when returning the assignments to the professor, letting him/her know what material is giving students the most trouble and what things they understand particularly well.
- If many students question your marking, the instructor may ask you to have office hours to address marking issues. Remember to be fair to all your students to avoid any perceived favouritism. Do not be persuaded into changing marks when undeserved or unnecessary.

- Detecting students who are cheating is important. If you have reason to believe that cheating has occurred please contact the course coordinator or instructor and present the evidence available. See section 3.5 (Cheating and the Academic Discipline Policy) for more details and Policy 71: <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-71>.

3.4.1 Recording Marks

Find out whether your instructor or supervisor has a preferred method for recording marks. If an error has occurred, then you should establish with the instructor how to make changes to the student marks. Please note that enrollment can fluctuate for a couple of weeks at the beginning of term and that your class list may change.

There are several simple ways to record marks:

- A paper or electronic copy of the class list.
- A table of marks kept in an ASCII computer file.
- A computer spreadsheet (e.g., Excel).
- Record directly on LEARN (the UW course management system; <http://learn.uwaterloo.ca>). LEARN keeps a viewable current class list on the Classlist page under the Content menu. The roster is updated regularly during the day. The roster of student names can be exported as a comma separated [.CSV] file of names in a format that will allow uploading marks into the LEARN course gradebook. Exporting a roster does not happen on the Classlist page, but on the Grades page.
- Courses that use Crowdmark will be able to import the grades directly into LEARN.

3.4.2 Distributing Marks and Student Privacy

- You must read and be familiar with Policy 46: “Information Management” as this policy has important information regarding the access to and release of student information: <https://uwaterloo.ca/secretariat/policies-procedures-guidelines/policy-46-information-management>.
- For student privacy and consideration, material that contributes to a student’s grade must not be left in a public place.
- **Comments and grades should be recorded on pages hidden from view of other students.**
- Exams and assignments should be returned only to the students who wrote them and not to other individuals, unless written permission has been given by the author.
- If it is your job to post model solutions, ensure that you have the location and timing details from the instructor. Model solutions, which are to be made available to students, should be clear and correct. Make sure that you are following copyright rules and good practices at the University. Check with the TA Supervisor and see <http://www.lib.uwaterloo.ca/copyright> for more information.

3.5 Cheating and the Academic Discipline Policy

Please familiarize yourself with Policy 71: <https://uwaterloo.ca/academic-integrity/integrity-students>. Cheating on exams, tests, or assignments is a serious offense (e.g., using unauthorized aids, unauthorized communication with others, excessive collaboration, plagiarism, etc.) and the consequences range from a grade penalty to expulsion from the University.

Cheating on an assignment or project includes the verbatim copying of another student's solution or collaborating excessively with another student. The only exceptions are assignments or projects which the instructor designates as group activities. The course syllabus should state explicitly how much students can collaborate if at all on assignments or projects. Check with your instructor as to what they would expect as an acceptable level of collaboration as this changes from course to course.

Any possible cases of cheating found when marking must be reported to the instructor who will determine whether cheating has occurred and take further action if necessary.

3.6 Proctoring Midterm, Tests, and Examinations

As part of your TA, you are expected to help proctor any midterms, tests, quizzes, and/or final exams for the course you are TAing. Midterm tests may be held during class time (in which case the instructor may not need a TA proctor) or during the evening. Final examinations are always written during the official examination period.

For exams and tests outside of normal class times, you are expected to discuss the details with your instructors. Typically, you are expected to appear 30 minutes before the exam begins in order to distribute the exam material and ensure the exam begins on time. Latecomers may write their test within 30 or 60mins of the test, so long as none of the other students have left the examination room and that they aren't given additional time. Check with your instructor as to their preference.

If there is a mistake or a typographical error in the exam questions, announce this at the beginning of the examination period and write the changes clearly on the blackboard. Also announce any examination procedures to be followed; for instance, you may not want anyone to leave the examination room during the last ten minutes to avoid disruption.

If the exam is held in a classroom, exam regulations require that students sit in alternate seats. Once the students have settled down, quietly take a head count as it is useful to know the number of examinees present (for example, if a test paper gets lost). Count the number of exams submitted before leaving the exam room. If there is a discrepancy, try to resolve it as soon as possible. A seating plan should be circulated to the students for them to indicate their ID# and position in the examination room. In this way, you can take attendance and discourage cheating by neighbouring students. During final exams, students must present their student ID cards and fill out the coloured identification cards supplied by the Registrar's Office. When collecting these identification cards, make sure to 1) verify the name on the card matches the name of their student ID card; 2) the student matches the picture on the student ID card.

If there is no clock in the examination room or if the one there is not giving the correct time, periodically post the time on the board (with greater frequency near the end of the exam period). If a student asks to leave the room for a short period, ensure another proctor accompany them in and out of the room.

During the examination, walk around the room frequently and change your location in the room and avoid sitting at the front of the room. It is important that the students realize that the proctors are being vigilant.

Clarify with the instructor how questions are to be answered; when answering questions, you must be careful not to give out too much information. If there is a problem understanding the wording of a question, you can clarify what is required, but do not discuss course material.

Make an announcement when there are only 10 minutes left in the exam period. Collect exams punctually; extend the exam period only on the professor's instructions. Remind the students not to discuss the exam until all papers have been collected. As papers are turned in, check each to make sure it has a name and student ID# on it.

If you detect possible cases of cheating during a midterm, test, or exam, you must inform the chief proctor as soon as possible. You must immediately write a note about the incident and keep any evidence, providing the student with a fresh exam sheet if necessary.

If you are unable to fulfill your proctor duties due to academic reasons, then they need to contact their instructor and/or the MUO and find a graduate student to serve as their replacement.

3.6.1 Math Faculty Pool Proctoring

The Mathematics Undergraduate Office (MUO) maintains a "pool" of graduate students that are selected at random each term. As part of the 80 hours of a TA duty, 3.5 hours are pre-allocated to assisting in the proctoring of a midterm or final examination in a course other than the one(s) to which he/she/they were assigned.

Proctors selected for midterm exams will have duties anywhere from the 4th to the 11th week of term. Proctors selected for final examinations will be notified at least 1 week before classes end. Individuals that are not able to fulfill their proctor duties must inform their instructor/Graduate Coordinator or the MUO ASAP and find another graduate student to take their place.

3.7 Unable to fulfill TA Duties

TAs are expected to be present throughout the academic term to fulfill their TA duties. If you are a TA and there is a valid acceptable reason that you cannot be present for an assigned TA duty (e.g., a shift at the Tutorial Centre, exam proctoring, conference, illness, emergency, etc.), it is your responsibility to alert the course instructor ASAP (Jordan Hamilton in the case of Tutorial Centre duties) to arrange for a replacement. Financial support each term is conditional on satisfactory academic performance and satisfactory performance of your TA and Graduate Research Studentship duties.

If you have any problems carrying out your assignment (for example, if your duties require more than five hours a week on average), you should first talk with your TA supervisor/instructor. It is also a good idea to discuss any problem you have with your own advisor. Other people you can approach to address such problems include your Graduate Officer, your Department/School Chair, and the Associate Dean of Graduate Studies, the Math GSA, etc.

3.8 Unsatisfactory Performance

Most TAs are enthusiastic about their work and perform their duties in a responsible manner. You are expected to take your duties seriously, in extreme cases, failure to do so will be treated under Policy 71: Student Discipline. A TA whose performance is unsatisfactory will be given a warning by their TA supervisor. Should a TA's performance continue to be unacceptable, the student will be reported to their respective Graduate Officer. This unsatisfactory performance may result in the cancellation of future TA assignments with a consequent drop in financial support in addition to discipline as outlined in Policy 71.

Resolution of a disagreement between a TA, TA supervisor, and Graduate Officer can be further facilitated by the Associate Deans of Graduate and Undergraduate Studies.

4 Additional Resources, Policy, and Guidelines

An excellent resource for additional TA support is the Centre of Teaching Excellence (CTE). The CTE supports graduate students at Waterloo through certificate programs, workshops, one-on-one consultations about teaching and teaching dossiers, and classroom observations.

The University TA Manual written by Svitlana Taraban-Gordon of the Centre for Teaching Excellence (CTE) is also an excellent support document. This manual can be accessed on the CTE website <https://uwaterloo.ca/centre-for-teaching-excellence/support-graduate-students>.

For additional information regarding policies and guidelines, please refer to the [GSPA Graduate Studies Academic Calendar: General information and regulations](#) for more information regarding:

- [Guidelines on graduate student support](#)
- [Help and information on campus](#)
- [Resolution of disputes between TAs and instructors and RAs and supervisors](#)
- [TA health, safety and environment training](#)
- [Use of computer network facilities](#)
- [Protection of privacy](#)
- [Ownership of student's work](#)
- [Research ethics](#)

Appendix A: Common Student Concerns

The Centre of Teaching Excellence (CTE: <https://uwaterloo.ca/centre-for-teaching-excellence/>) has many workshops that would be able to help you address many concerns you may encounter as a TA.

“The TA’s don’t understand the course material”.

Make sure that you are capable of TA’ing the course to which you have been assigned. As a graduate student, you are expected to have a general competence in your area. You are expected to know in detail the material in the courses you are TAing. If not then you must spend the time to learn the material, and this time is not included in a TA’s work hours.

“TA’s are unapproachable, unfriendly, condescending, and impatient.”

It is your job to help students; your demeanor is very important and can affect the way a student learns the subject matter. The Centre for Teaching Excellence has several courses that would be able to help you build a positive rapport with students.

“They don’t seem to have read the assignment, so how can they help me with it?”

You should familiarize yourself with the current material and assignment before you tutor or mark.

“Their English is so bad that I can’t understand what they’re saying”.

The ability to express oneself clearly in English is expected of TAs. The International Student Experience team located in the Student Success Office (SCH) has courses available to help you improve your language skills. Renison University College, English Language Institute (affiliated with UW) also offers ESL (English as a Second Language) graduate courses (no additional tuition fees required).

“There aren’t enough comments on my paper to know what I did wrong.”

Point out the key error in an incorrect solution and refer students to the solutions when necessary. As needed, ask the students to come and see you in person if you are unable leave a comment on paper.

“They slavishly follow the marking scheme and won’t admit another solution is correct.”

If you make sure that you understand the material, marking unique solutions should not be a problem.

Appendix B: Contact Information

- [Mathematics Graduate Office \(MGO\)](#)
- [Mathematics Undergraduate Office \(MUO\)](#)
- [Mathematics Tutorial Centre](#)
- [Computer Science Instructional Support Coordinators](#)
- [Computer Science Consulting Centre](#)
- [Mathematics Counseling Services](#)
- [Human Resources Payroll](#)
- [Student Financial Services](#)
- [Conflict Management & Human Rights Office](#)
- [Centre for Teaching Excellence](#)