Vehicle Dynamics and Optimization Laboratory Expectations and Policies

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1   Introduction

As a research assistant in the Vehicle Dynamics and Optimization Laboratory (VDOL) at the University of Florida you will play an important role in the development of novel computational methods for solving optimal control problems. The current emphasis of the lab is on the development of a computational framework for the numerical solution of complex constrained optimal control problems. The application base is wide and includes space flight, atmospheric flight, ground vehicles, and biomechanics. The primary technical fields used for this endeavor include analytical dynamics, differential equations, nonlinear optimization, and lots of computer programming (primarily in Matlab and C/C++).

2 Expectations

2.1 Academic performance

2.1.1 Grades

Students in the lab are expected to perform well in all of their courses. We want other faculty in the department to view the students in our lab as some of the best students in the department. One of the best ways to achieve this goal is for every student in the lab to perform well in every course. While it may not be possible to obtain an A in every course, I expect every student to give his or her best effort in each course taken.

2.1.2 Attitude

All students in the lab are expected to relate to their professors with the utmost respect and with a positive attitude.

2.1.3 Honesty

Every student in the lab is expected to behave with the utmost integrity and honesty in all academic endeavors. Cheating of any kind will not be tolerated in the lab. Any student caught cheating on an exam or course assignment will be dismissed from the lab, including loss of funding.

2.1.4 Courses

All research assistants in the lab are expected to take the following courses to prepare them for research:

- EML 5215 Analytical Dynamics

- EML 5311 Linear Control

- EGM 6281 Robot Geometry I

- EML 6934 Optimal Control

- ESI 6420 - Fundamentals of Mathematical Programming

The first three courses are required for the PhD qualifying exam and should be taken in the first year so that the qualifying exam can be taken in the Fall semester of the second year. In addition, research assistants who are not already proficient in C/C++ programming are also expected to take a C/C++ programming course (check with other students in the lab for good courses, as not all C/C++ programming courses are taught well). Finally, the mathematics department offers an excellent course in numerical linear algebra and numerical optimization. Students are encouraged to take both of these courses.

2.2 Research performance

2.2.1 Progress

The most important yardstick of your research performance is research progress. Each research assistant in the lab is expected to make significant research progress each semester. Expected progress will be discussed and agreed upon between you and I at the start of each semester, and expectations will be based on the amount of time available that semester for research (that is, coursework or teaching assistant responsibilities will reduce expectations). When research goals are not met, we will discuss the situation in light of the additional performance expectations listed below. Our goal will be to determine whether poor progress was due to unavoidable circumstances, poor communication or advising on my part, or poor performance by the research assistant. My goal is to provide each student with whatever resources and support he or she needs to be successful in research. The renewal of the research assistantship each semester will be contingent on demonstration of satisfactory research progress at the semester review meeting.

2.2.2 Motivation

Every research assistant in the lab is expected to be self-motivated. The best PhD students push their projects forward on their own and do not require me to push them. If I have to motivate you to make research progress, then the PhD program is not for you. I do not have the time or energy to push forward underperformers in the lab.

2.2.3 Independence

One of the biggest limitations you will encounter in your research is my availability. Unfortunately, faculty members have a wide variety of time pressures (teaching, research, administrative service, graduate student supervision). Amongst all of these valuable activities, graduate student supervision is one of the activities that I enjoy the most. However, if you wait until you can meet with me to discuss a problem you are encountering with your research, it will take you a long time to resolve each problem. Instead, my goal is for each research assistant to learn to work independently without my supervision to the fullest extent possible. This goal means that you will need to learn to take initiative to resolve problems on your own. An approach for how to resolve research problems without my assistance are provided in the next section below.

My hope is that each of you will learn how to work independently and think creatively to solve whatever problems you encounter in the course of your research. I am here to help as well, but my goal is that you will be able to use your own problem solving skills to resolve the majority of issues that you encounter in your research.

2.2.4 Resourcefulness

Research is full of obstacles that will prevent you from making progress. When you hit an obstacle, I expect you to think through all of the different ways that you could resolve the problem on your own. Then I expect you to try each possibility, and repeat the process until the problem is resolved. A specific suggestion for how to do this is as follows:

1. Make a list of three possible approaches that you can take to resolve the problem or understand it better (e.g., search the web, read a book or journal article, talk with other students in the lab, attack the problem using two different approaches).

2. Try each possibility, and make detailed notes on what you learn.

3. Based on what you learn, make a new list of three possible solution approaches, and repeat the process. When you meet with me to discuss problems you are having in your research, the first thing I will do is ask to see your lists of possible solutions and what you learned by trying them. In many instances, you will be surprised to learn that you will be able to resolve your problems on your own without my assistance. That said, I am glad to provide assistance when necessary, and I realize that you will not be able to resolve every research problem by yourself.

Your research progress is ultimately your responsibility. If there is something that you need to move forward with your research (e.g., software, a journal article), figure out on your own how to get it. Most journal articles can be downloaded for free from www.uflib.ufl.edu. Software or other items can be purchased using my work credit card (I will provide the number as needed). If there is a problem that is blocking you from moving forward, figure out how to resolve it. Again, do not wait for me to figure things out for you. Make your best effort to keep your research moving forward on your own, and I will be glad to help you when you are truly stuck.

2.2.5 Cooperation

There is a great deal of knowledge available from other students in the lab. More experienced PhD students are expected to help the newer students with questions and other ramp up tasks. At the same time, newer students are expected to be sensitive to the time constraints of older students, especially as they approach graduation. Overall, I want the lab environment to be a mutually supportive one. Cooperation also means contributing to the general upkeep of the lab. Upkeep includes basic issues such as vacuuming the floor (vacuum cleaner available in the closet at the far end of the hall), cleaning up the lab area, working with MAE Technical Support to have software on the computers updated, or maintaining the automatic backup system in the lab.

2.2.6 Integrity

As with course work, each research assistant is expected to maintain the highest standards of integrity in your research work. The falsification of data, improper data selection, use of another persons work without permission, plagiarism, and any conduct that intentionally misleads constitutes scientific misconduct. Any student who knowingly engages in scientific misconduct is subject to dismissal and may also be subject to university regulations and penalties.

3 Policies

3.1 Time

3.1.1 Work hours

Graduate students in the lab receiving a paid salary, either from a grant obtained by me or a scholarship/fellowship provided by the University or some external source, are considered employees of the University of Florida under my supervision. As such, you are expected to work a minimum of 40 hours per week, just like any other University of Florida employee. In reality, you will normally work much more than 40 hours per week as I do. During the semester, the 40-hour minimum is split between a minimum of 20 hours for research (or 10 hours for research and 10 hours for teaching assistant duties if you are a TA) and 20 hours for class work. Your research time is why you will typically take 9 instead of 12 or more credits per semester. Between semesters, over breaks (for example, Christmas break and spring break), and during the summer, the entire 40+ hours per week is to be used for research. Note that while Christmas and other breaks are a break from classes, they are not a break from work. In fact, breaks are one of the primary times during the academic year to make significant research progress due to the lack of course assignments and other distractions. I provide these minimums not because I am going to check up on anyone but rather as basic guidelines so that you can determine if you are putting in the time on your project that you should be putting in. I have found in the past that research assistants sometimes do not view their projects as a priority and so do not put in even this minimum number of hours. However, the reality is that your research project is the primary reason for your funding. I realize that some weeks will be more difficult than others due to exams and class assignments, so the expectation is that you average the above hours as a minimum.

3.1.2 Work schedule

Given that I expect all students in the lab to be self-motivated and self-directed, I do not require you to work any specific hours but instead allow you to set your own work schedule based on when you find you are most effective. For example, I get my best writing done either early in the morning or late at night. Consequently, I sometimes take time off in the afternoon to do other things, since afternoons are lower productivity times for me. That being said, I expect to see you in the lab on a regular basis during core weekday hours (Monday through Friday from 9:00 AM to 4:00 PM), but I do not expect that you will work in the lab all of the time. If you are more productive working at home, or at the library, or anywhere else, that is fine with me provided you work nominally in the lab during the aforementioned core weekday hours. Remember, however, that regardless of where you do your work, it is results, not effort, that counts. Working in the lab provides a mechanism for you to get input from other researchers and will reduce the number of distractions.

In addition to working the lab nominally during the aforementioned core weekday hours, all members of VDOL must attend all lab-related events. Such events include, but are not limited to, PhD proposals, PhD defenses, visitors from outside UF (including graduate recruiting in the Spring semester), and any infrequent lab meetings we might hold. Unless you are ill, have an emergency, or have been given prior approval in writing by me (that is, a request sent via email and approved by me also via email), you are required to attend the aforementioned lab events.

3.1.3 Vacation

The University of Florida has no official vacation policy for graduate student employees. Some advisors do not give their students any vacation time, which I believe is unreasonable. I have decided to give every student in the lab two weeks of paid vacation time, to be used whenever you would like subject to prior written approval via email by me. Two weeks is the standard vacation time in the United States. However, we work hard in academia, so I am happy to consider requests for a third week if I feel you have been making exceptional progress in your research. Keeping track of your vacation time is on the honor system. I will not micro-manage anyone but will trust the honesty of each of you. I consider the vacation cycle to run on the academic year calendar starting in mid to late August. Official University of Florida holidays (for example, Thanksgiving Day, Christmas Day, New Years Day) can be taken off and do not count against your vacation time.

3.1.4 Deadlines

When I ask someone to do something for me by a particular time, I mean it. It is not a suggestion or a request. Basically, I am the employer (hopefully a benevolent one) and the research assistants are the employees being paid to work for my company (the VDOL Lab). Because you are being paid to provide service to the lab, if I ask you to do something for me related to work in the lab, I expect you to do it. If some extenuating circumstance prevents you from doing this, I am reasonable as long as you communicate the situation to me.

3.2   Publications

3.2.1   Authorship

In academia, the question always arises as to who will be the first author on any journal or conference papers generated by the student. My philosophy on this issue is as follows:

- If you do the work and you write the paper (with my input on both the work and writing of course), then you are first author.

- If you do the work but do not write the paper, and I have to write the paper, then I am first author, and you become second author.

- If you contribute significantly to the work, then you are included as a co-author (the determination of significantly is made by me).

- If you do the work and write the paper, but the paper is rejected, and I have to do significant additional work and writing on my own to get the paper published (e.g., because you graduated and are no longer available to work on the paper), then I am first author and you are second author. However, if you perform all of the additional work and writing needed to get the paper published, then you remain first author.

In general, every paper that comes out of the lab will have multiple authors. Author order will be in order of significance of contribution, with the most significant contributors being listed first. My name will typically go at the end of the author list as the corresponding author.

3.2.2 Manuscript Preparation

All students in the lab will be required to use the following standards when preparing journal or conference papers for submission:

- LaTeX will be used for all documents including conference articles, journal articles, presentations, and Ph.D. theses. The LaTeX Beamer class is required for presentations.

- All scientific figures (plots, etc.) will be made using MATLAB and must be output as EPS files. These EPS files must be made such that the LaTeX macro package psfrag can be used to replace the text in the EPS files with LaTeX commands.

- All illustrations will be made using Adobe Illustrator. These illustrations include any drawings that are required for papers and presentations.

- All papers and code will be version controlled on the VDOL server machine (http://vdol.mae.ufl.edu) using the open-source version control software Subversion. If you do not know how to use Subversion, many tutorials are available online and I encourage you to study them.

The lead author of any paper is responsible for submission of the manuscript and for completion of the appropriate copyright forms if the paper is accepted for publication. Please take these requirements seriously. I will expect you to do whatever it takes (for example, drop travel plans, miss sleep and/or meals, as I have been forced to do more times than I would like to admit) when paper deadlines arise or if we are in the process of completing a journal manuscript.

3.2.3 Conference Travel

Research assistants will be selected for conference travel based on the following criteria: (1) acceptance of paper for presentation, (2) research relevance, (3) research productivity, and (4) availability of travel funds. The student will serve as a representative of VDOL and is expected to maintain the utmost professionalism. The proper forms for travel authorization may be obtained from the research advisor and must be submitted prior to travel. The travel allowance is the standard university allowance.

3.3 Operations

3.3.1 Data Safety

The main products produced by our lab are software, computer models, and computational results. Consequently, it is critical that everyone in the lab backs up his or her data on a regular basis. A co-worker of mine in industry used to have the following phrase displayed in bold letters on his computer: HARD DISKS DIE!!! The purpose of this display was to remind him to back up his data regularly. Each student in the lab is responsible for ensuring the safety of his or her research data (software, models, data, results). Back up your data at least every two weeks.

3.3.2 Software Distribution

If you receive a request from someone outside the lab for software we have developed in the lab (for example, Matlab or C/C++ code), models we have developed in the lab or data we are using in the lab, please do not respond until you have talked with me. I will assess all requests for software, models, and data and determine which ones we can and should respond to. UNDER NO CIRCUMSTANCES IS ANYONE IN THE LAB TO DISTRIBUTE SOFTWARE, MODELS, OR DATA TO ANYONE OUTSIDE THE LAB WITHOUT MY PRIOR CONSENT.

3.3.3 Lab Security

If you are the last person in the lab, *always* make sure the door is closed properly when you leave (the door has an automatic lock on it with a coded panel, so it does not need to be locked upon exit). We have not had any important items stolen from the lab yet, and I want to keep it that way.

3.3.4 Phone Calls

The lab phone is for making campus-wide phone calls or for emergencies. In this day and age where each of us has a cell phone with a large number of minutes, all other phone calls should be made from your personal cell phone.

4 Conclusions

I believe that the expectations and policies listed above are very reasonable. If you have any questions about any expectation of policy, please let me know. I have developed these guidelines after a great deal of thought, but these guidelines will continue to evolve as the lab moves forward. I welcome any comments on how we can make things work better. I want each of you to have a rewarding experience working in the lab, and my goal is to do whatever I need to do on my end to empower each of you to be successful.