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**WELCOME** to our Group, NIH!

The goal of our research group is to develop an efficient and highly productive clinical research group focusing on XX research. This requires a concerted team effort from a diverse group of individuals.
The purpose of this document is to communicate important information regarding the research group. Although I believe that everything in this document may be applicable to you, some things may apply more or less to you than to others, i.e., to different degrees. As you read through this, please keep in mind that it was prepared to be directed to a group of individuals with a wide variety of backgrounds and training.
In general, I'm a "hands-on" person. I will give more freedom as I sense your comfort level, reliability, and expertise with a particular responsibility.

- FELLOWS/TRAINEES: The foremost objective of the fellows program is to provide scientific training while you contribute to the goals of our research program and advance your career. In addition to learning how to perform clinical and translational research, an important goal for you should be to develop excellent communication skills that will promote your advancement within biomedical science. This involves becoming a contributor who can present his/her own work, and a listener who can offer and accept constructive criticism. Thus, participation in lab meetings, seminars, and abstract and manuscript preparation, as well as journal and manuscript reviews will constitute an important part of your training. This communication provides you with guidance as to what will be expected of you—and what you can expect—during your time here. Meeting this challenge should provide you with a good foundation towards your research career.
- EMPLOYEES: You form the central core of this research group, which strives to maintain its position in excellence in research. Your contributions are vital to the success of our group and serve as the continuity for this research program year after year. In addition to promoting this group's research goals, an important goal for you should be to continue your professional development. I encourage you to think about what your professional development goals are and to discuss them with me. Toward this goal, I am supportive of your identifying opportunities to enhance your professional development as long as they promote rather than detract from the primary purpose of our research group.

**CONDUCT OF RESEARCH**

You are expected to maintain the highest level of scientific integrity. Formal discussions of ethics related to scientific issues occur in a group meeting format annually; your attendance is mandatory. Honesty, constructive criticism, and responsibility are expected of you and your coworkers, and you should know what to do or who to contact if something goes wrong. You may find such information in "Guidelines for the Conduct of Research in the Intramural Program at NIH" (http://www.nih.gov/campus/irnews/guidelines.htm) that discusses such things as: Responsibilities of Research Supervisors and Trainees, Data Management, Publication Practices, Authorship, Peer Review and Privileged Information, Collaborations and Financial Conflicts of Interest. This is a general but useful source of information and is required reading. In general, if something goes wrong, go to your supervisor (me) first, or another Branch PI, or the Branch Chief.

Please remember that research protocols and details associated with the protocols can be considered intellectual property. This information should not be shared with others unless you have obtained my approval. I have seen protocols accidentally routed to a competitor. Please treat protocol material and especially patient material as confidential.

In addition to conducting research in an ethical manner, your safety is also very important. Please follow the standard safety guidelines for patient care and laboratory areas. Along these lines, open-toed shoes are not allowed in areas that have sharps or potentially hazardous materials.

**EXPECTATIONS OF WORK HABITS; THE QUANTITY AND QUALITY OF TIME**

In addition to providing training, our Research Group is responsible for maintaining a competitive clinical research program whose progress will be monitored regularly and funded according to its productivity. Everyone's efforts are of paramount importance to our success.
You are expected to spend your time performing protocol-related work, evaluating patients, and evaluating or discussing data in a professional manner. If you aren't busy, you may be distracting others. If you plan to be away, you are responsible for notifying me in advance. I believe in a positive cohesive working environment.

- My core work hours are 8:15-5pm. I prefer that your schedule overlap with mine as much as possible, because this increases opportunities for us to communicate. I expect that individuals are present between most of the core hours of 8:30am-5pm.
- I typically go "off-line" until ~9pm. I am often working from 9-11:30pm.
- If I don't respond to an e-mail readily, I am available by phone. Please check my schedule to ensure that I'm not with a patient or in a meeting.
- I can be available on the weekend. If you need a response to an issue over the weekend, please let me know in advance. I want to ensure that I am able to respond in a timely manner.
- During the week, I am accessible in person and via e-mail and pager. I generally respond to an e-mail within a day. Please feel free to re-send your e-mail again if you haven't had a response in 1-2 days. At times, I may be conducting some research to better answer your question.

Please ask if you want to meet with me or need my help. I often accomplish much work outside of traditional work hours and I will be enthusiastically supportive to see you do the same. Use your time well, work efficiently, put in productive hours: strong efforts on your part will be noted most positively.

**STAFF/LAB MEETINGS**

- Weekly clinic staff meetings are on Mondays at 9am in the conference room. This meeting reviews topics related to clinic operations, Grand Rounds (2$^{nd}$ and 4$^{th}$ weeks of each month), attending coverage, vacations, conferences, rotating residents, etc. The clinic nurses will draft the agenda and should be notified if topics need to be added to the agenda.
- The Clinical Research meetings (clinical research group and our main collaborator) are on Mondays beginning at approximately 9:30am in the conference room (Will take place after data meeting on those specific Mondays). We review recruiting, protocol/regulatory, sampling, and goals for the clinical protocols. One of the research nurses drafts the agenda.
- The data meeting is a Monday 9:45am meeting with the data managers from the contractor who supports our data management needs and occurs twice a month. The data meeting examines progress of data inputting, adverse events, etc.
- Our lab meetings are on Mondays at approximately 10am for fellows/trainees to discuss progress of laboratory/research data and analyses.

- Fellows are expected to attend our collaborator's lab meeting every other Tuesday at 1 PM in the fourth floor conference room. The lab meeting lasts approximately 1.5 hours and takes place year round. This is an informal meeting when each postdoc/fellow in both groups presents their work/progress/challenges. There is opportunity to discuss analyzed data, to visualize the central findings, etc. This is a private meeting and all topics discussed are considered confidential.
- There is a Branch Talk when branch fellows are expected to present current progress on research projects. This occurs after Grand Rounds at 10am.
- Grand Rounds typically occurs on the 2nd and 4th Thursday of the month. Patient viewing is from 8-9am in the clinic and the presentations/discussion are from 9-10am. Since there is patient viewing, professional attire is required.
- There is an annual mandatory "All-Hands" meeting for Branch members to discuss any issues relevant to the entire Branch.

**JOURNAL CLUBS**

- The Branch weekly basic science journal club is held Fridays at 8:10am. Each Branch PI, fellow, rotating resident, student, and lab tech will present one article for discussion each Friday on a rotating basis.
- Clinical journal club is held on the last Wednesday of each month. Two articles are presented each time. Branch PIs, PA/NPs, clinical fellows, lab fellows, rotating residents and students are expected to attend and participate in the rotating roster of presenters. Research nurses are encouraged to attend and can opt to participate in the roster of presenters.

**LEAVE**

It is expected that all leave requests must be approved. Before you make travel plans, please discuss this with me. I place quality patient care as a high priority, and we must, therefore, ensure that a plan for proper coverage of potential patient care issues is in place. All MDs in the branch will rotate holiday coverage, and the branch clinical research nurses will also rotate holiday coverage outside of the federal holidays.

**PROFESSIONALISM/E-MAIL ETIQUETTE**

I strongly believe in professional behavior in the workplace, including appropriate attire for the workplace. Professional attire is expected in patient-care areas; casual attire including jeans, flip-flops, etc. are not appropriate for patient-care areas. Professional attire conveys respect for the patients. All individuals—from cleaning personnel to institute directors—deserve respect. I support an environment where individuals feel able to perform their work activities to the best of their abilities. If you ever feel that there has been disrespect directed at you, please come talk to me.

I expect a response to my e-mails in a timely manner (approximately 1 day). Even if you do not have an answer to my question, I would like an estimated time that you might have an answer. Please use e-mail professionally. Be aware that sometimes individuals may be bcc'd or that sometimes we accidentally hit "Reply to all" vs "Reply."

Turn on your out-of-office automatic response if you are sick/on vacation and do not plan to respond to e-mail. When you use your out of office notification, please designate who is covering and include their contact information in your automatic reply.

**EVALUATIONS**

I evaluate all research group members every 6 months. Additional evaluation on a formal or informal basis can be performed on a quarterly basis if requested by either party. Fellows are expected to function with increasing independence over time, and to assume additional responsibility for our work. Increased independence should never be confused with a lack of accountability. Everyone must be accountable, always.

You should be aware that I am often asked to evaluate people before and after they leave our group, specifically by potential employers and fund-granting agencies. It is not uncommon to be asked to rank a candidate in several categories. A typical "Reference Report Form" includes:

- Knowledge in the chosen field
- Motivation and perseverance toward goals including “work ethic”
- Ability to work independently
- Ability to work as a member of a research team
- Ability to plan and conduct research
- Ability in oral expression
- Ability in written expression
- Imagination and probable creativity
- Communication skills.

They also ask for ranking, i.e., top 2%, top 5%, top 10%, top 25% of fellows, etc. It is helpful to keep these items, and your responsibilities, in mind during your training, and always to conduct yourself as professionally as possible.

**MONEY AND PROPERTY**

Most items that require purchasing must be submitted through the online POTS (Purchase Order Tracking System) system. The branch purchasing agent works offsite but is available by e-mail (and sometimes phone). All purchases will be routed to me for approval. Do not pay for things personally and expect to be paid back. There is no ‘petty cash’ option with the government.

You cannot take a computer or other device (projector) off campus without an issued property pass.

**ATTENDING OUTSIDE MEETINGS** is important, not only to hear recent developments before their publication, but also to allow others to get to know you and your work. I am happy to use funds to support travel for fellows who have submitted an abstract to FARE (see below, win or lose; however, FARE recipients get additional free travel money), on condition that you submit an abstract for talk or poster presentation at the meeting. This usually involves submitting an abstract describing the work to be presented to the meeting coordinators at the time of registration. I encourage employees to consider attending a meeting each year for professional development.

Travel while you are paid by the government is NOT easy. Several details will require your attention as soon as possible.

- You must start by discussing potential meetings with me.
- After obtaining approval, there are several items that need to be addressed in a timely manner:
    - Travel order (you will need the help of the Branch admin who will want the travel dates, hotel reservation, meeting information)
    - Flight reservation: Federal employees are limited in annual leave taken in conjunction with your travels. For international travel, there are minor variations and also requirements for a government-issued passport.

- Meeting/conference registration: Do **not** pay for any meeting registration out-of-pocket. The branch purchasing agent processes payment for registration after the order is placed in POTS.
- Hotel: The exception to paying out-of-pocket is hotel costs for outside meetings/conferences. Be aware of the per diem for the city you are traveling to. There is a limit to what the government will pay for a hotel in each city. If you book a hotel that is more expensive than the per diem rate, you will pay the remainder out-of-pocket. PLEASE keep receipts and you will be reimbursed after your return and after you submit the appropriate paperwork to the branch admin.

**CHARTING AND NOTEBOOK/RECORD KEEPING**

Proper and thorough charting/record keeping is vital to effective and efficient research. Patient notes should be submitted within 24 hours. Lab notebooks are expected to be organized. I am supportive of team members using their own system of organization as long as notes can be easily found and referenced.

**AUTHORSHIP & COLLABORATIONS**

If you are submitting an abstract for a meeting, please send it to me at least 2 weeks in advance for approval. If it's an abstract that you've submitted previously, please still let me know. Sometimes there are authorship or other considerations based on who else is attending the meeting. When you make a significant intellectual or experimental contribution to a project, then you will typically be an author on the manuscript. However, there have often been considerable resources devoted to a project before you ever receive the samples/data to analyze (e.g.; development of an IRB approved protocol, recruitment of patients). Even if others do not contribute a figure to a paper, they may also deserve authorship. Authorship (including order of authors) is always discussed before a manuscript is submitted from the lab.

Before you enter into collaboration with a member from another research group, speak with me first and certainly refer the potential collaborator to me. Although it is not required that you speak with me before you make a request of others, I prefer that you send me a draft of the request before you send it to the outside researcher. Requests by others for materials/information from our group must be discussed with me before they are distributed. If there is a misunderstanding or a conflict with a collaborator – talk to me. Remember that the lab may have multiple interactions with this lab or individual who may be affected. We may also have a history with this individual that helps to explain what you perceive to be an odd response.

I believe in an open-door policy. I encourage you to always feel free to come to me with any concerns or questions.

Thanks,

K

DEPARTMENT OF HEALTH & HUMAN SERVICES Public Health Service

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November 21, 2014

Welcome to the Section on Molecular and Cell Biology (SMCB) in the Laboratory of Molecular Growth Regulation (LMGR) in the Intramural Research Program in Genomics of Differentiation (PGD), of the NICHD.

The purpose of this communication is to transmit important information that I feel will contribute to your success here and beyond. The foremost objective of the fellows program is to provide you with top-notch scientific training while you contribute to the goals of the SMCB program and advance your career. Your training will be broadly based within the realm of Molecular Biology, Biochemistry and Genetics. It will be achieved through your own work as well as that of other members of our group, other LMGR-PGD members and associated colleagues whose work and experiences you are also expected to learn from. As you read through this please keep in mind that it was prepared to be directed to a group of Fellows with a wide variety of backgrounds and training. Although I believe that everything in this document may be applicable to you, some things may apply more or less to you than to others, i.e., to different degrees.

In addition to learning how to choose, design and expedite new experiments, an important goal for you should be to develop excellent communication skills that will promote your advancement in biomedical science. This involves becoming a contributor who can present his/her own work, and a listener who can offer constructive criticism. Thus, participation in data clubs, seminars, and abstract and manuscript preparation, as well as journal and manuscript reviews will constitute an important part of your training.

This communication provides you with guidance as to what will be expected of you—and what you can expect—during your time here. Meeting this challenge should provide you with a good foundation for a career in biomedical research science.

**COMMUNICATION, COMMUNICATION, COMMUNICATION –Seminars, Talks, Abstracts, Manuscripts, and Participation in Lab Meetings**

Communication of experimental results in the form of abstracts and talks, and via manuscript preparation, is the most important way to improve your opportunities for career advancement. Through your ability to acquire, develop and communicate experimental results, your worth as a scientist will be evaluated by the scientific community. Senior LMGR PIs (e.g., Drs. Howard, DePamphilis, Ozato and Clark) as well as Staff Scientists and Fellows will also learn about your work at the Monday

Morning Seminar Series. They may be asked to evaluate you; or you may want them to write you a letter of recommendation. Therefore, it is invaluable to make a good impression through hard work, group participation and good communication skills.

Future employers will look for a good researcher who not only has a strong publication record, but one who can also contribute to their department or company as an advisor—through stimulating discussions and collaborations; ideally they want someone who is easy to communicate with. Therefore, along with good presentation skills, you should work to develop the highly valued ability to offer *constructive* criticism in group meetings. Although this does not mean that you should feel pressure to make comments in group meetings, quality remarks can help the speaker and make a good impression. You will have this opportunity at the Monday Morning Seminars, Tuesday SMCB Lab meetings and seminars by speakers from other Institutions that are invited to the LMGR.

**SMCB LAB MEETINGS:** You will be expected to discuss your work in lab meetings, which occur on Tuesdays at 3:30 PM. You should prepare presentations with introduction and background information and include your raw data. You will be expected to present your data approximately once every three months. We may also engage in a group discussion of your data and your project in lab meetings without a formal presentation. On some occasions Lab meetings are a good venue for detailed review of a publication from another lab (i.e. journal article review).

**PRESENTING AT NIH INTEREST GROUPS:** The SMCB has the opportunity to present a talk, usually once per year, at both the NIH RNA Club and the Washington Area Yeast Club (4:30 PM, second Wednesday of the month in bld 6A, conference room 4A05), and occasionally at Lambda Lunch. I will invite a fellow with a reasonably advanced story to present on behalf of the SMCB. If you would like to make a presentation in these forums, please ask me.

**ATTENDING OUTSIDE MEETINGS** is important, not only to hear recent developments before their publication, but also to allow others to get to know you and your work. I am happy to use SMCB funds to support travel for fellows who have submitted an abstract to FARE (see below, win or lose; however, FARE recipients get additional free travel money), on condition that you submit an abstract for talk or poster presentation at the meeting. This usually involves submitting an Abstract describing the work to be presented to the meeting coordinators at the time of registration.

**SUBMISSION OF ABSTRACTS TO NIH FUNCTIONS:** You should expect to submit abstracts both to the annual Fellows Awards for Research Excellence (FARE) and to the NIH Research Festival programs. The FARE program provides Travel Awards valued at about $1,000 annually to NIH fellows on a competitive basis. About 25 percent of the abstract submitters receive an award. Receiving a FARE award is a significant achievement that will increase your recognition in the LMGR, the NIH, and beyond. If you win, this should be listed on your C.V. as a competitive award.

**NETWORKING:** We know from experience that although a good publication record is important, it alone may not be enough to launch or establish your career. In addition to

the opportunities listed below, I will make colleagues aware of your work and when possible, introduce you to them, and promote your exposure to the community. I do this by naming you when you help with manuscript reviews for journals, in communications with other scientists, when I talk at meetings and seminars, and by recommending you for talks at meetings. Also, you will have the opportunity to talk with established researchers when they are invited guests of the SMCB and on occasion other NIH Labs. Please inform me if you would like to meet with a visiting scientist.

**JOB SEMINAR:** Developing a good presentation or "job seminar" is a very important feature of a job interview. The program provides many opportunities for you to see how others present and to learn from good presentation styles as well as the bad. Others will also have the opportunity to critique your presentations.

**DATA PRESENTATION -THE VALUE OF MULTIPLE FORMATS AND VENUES**

Learning to increase the rate at which your data can be interpreted, so as to produce useful information, is one of the most challenging objectives for all scientists. The experienced experimentalist chooses incisive experiments with as many controls as possible as the surest way to achieve this. Frequent discussion of your raw data with me is probably the best way to keep your project moving on the right track. We will discuss and plan how to proceed efficiently, develop testable hypotheses and explore interesting findings. I would like you to inform me of your results at least once every two weeks, preferably more frequently.

I have found that the means by which I acquire and process information is influenced and enhanced by the setting; for example, sometimes I articulate things differently in a casual one-on-one setting rather than in a group discussion; and other times, vice versa. Also, we may interpret a piece of data in a one-on-one discussion differently and/or more extensively than we would if it's presented in a group meeting, perhaps because during the latter more formal introduction and background are provided and the rationale for the experiments are placed in the context of the scientific literature. Moreover, sometimes it just takes time and repetition before all of the implications of some data "come" to me. Therefore, I feel that data, hypotheses and models, etc. are best presented and discussed in a wide variety of formats, one-on-one talks in my office, lab meetings, corridor discussions, etc. Please seek me out to tell me about your progress at least once per week. This should help us extract as much information as possible from the data and provide ample opportunities to make connections to other data and different systems.

Your presentations at Data and Journal Clubs, as well as Seminars, should be well prepared. You should take these very seriously. Rehearse your presentations for Monday Morning Seminars, talks at meetings, RNA Club meetings, and any other talk where you will represent the SMCB in public. Electronic imaging facilities are available in the LMGR and are constantly improving in quality and usability. If you don't know already, please learn how to use graphic aids to effectively increase the friendliness and information content of your presentation. Models, statements of hypotheses and graphic depictions of experiments go a long way to improve the communicability of presentations. These types of slides often stimulate the most useful discussion.

**CONDUCT OF RESEARCH**

You should function at the NIH with the highest degree of scientific integrity. Workshops and formal discussions of ethics related to scientific issues occur in a group meeting format annually in the LMGR; your attendance is mandatory. Honesty, criticism and responsibility are expected of you and your coworkers, and you should know what to do if something goes wrong. You may find such information in "Guidelines for the Conduct of Research in the Intramural Program at NIH" (http://www.nih.gov/campus/irnews/guidelines.htm) that discusses such things as: Responsibilities of Research Supervisors and Trainees, Data Management, Publication Practices, Authorship, Peer Review and Privileged Information, Collaborations and Financial Conflicts of Interest. This is a general but useful source of information and is required reading. In general, if something goes wrong, go to your supervisor (me) first, or another LMGR PI, or the LMGR Lab Chief, Bruce Howard.

**AUTHORSHIP & COLLABORATIONS**

Because of the way that projects develop in this Section there is usually not conflict over authorship, but on (rare) occasion disputes among fellows over first authorship have arisen. We want to avoid this by discussing it openly ahead of time. In case of a dispute, I will be the major determinant of the order of authors. Some conflicts arise when a fellow comes into a project that is already ongoing and for which other or previous fellows have already done considerable work. Often the later arriving fellows have little appreciation or knowledge of the contribution of the departing or departed fellow and naively believes that the project is His or Hers and should be in full control. It is important that we discuss any anticipated order for authorship not only at the beginning of a collaboration but also as it continues as it can change depending on the development of the project and the work done or to be done. In general, fellows who add to an ongoing project that has already undergone substantial development, i.e., for which much data has already been obtained, will not be first author. However, exceptions may apply as each story and the way it develops is unique. For example, in some cases much data may have been obtained by multiple people who each contributed a small part, but with none with a leading role. I can see how in this case a newcomer could make significant additions and become first author. What is most important is not to assume anything about the situation and to discuss it with me.

As alluded to above, another recurring issue is "ownership." Even when people understand that NIH "owns" the data and the biological materials, they often think that the project they are working on is "theirs" and interpret that to mean that they have extensive rights with respect to the project including the right to decide with whom they can collaborate and even the right to decide the future scientific direction of a project, even to the point of believing they can override the PI's preferences.

Criteria used for determining first authorship are not altered because someone is looking for a job. One is no more entitled to first authorship when they are on the job market than the circumstances normally dictate based on their work relative to others.

As a member of the SMCB you should expect to coauthor another SMCB member's primary paper only if you have made significant contributions. Although collaborations among SMCB members are encouraged and common, these should be entered into and agreed upon explicitly by the individuals involved as well as me. Usually, co-authorship

requires you to generate data that is included as a Figure in a published paper; simply providing advice/suggestions or a reagent is not enough, unless the reagent is either created specifically for the collaboration or has not been published previously. I may make exceptions depending on the case. I may ask you to teach someone an assay or technique, but this does not mean you should necessarily expect to be a coauthor. These important issues should be discussed to avoid potential misunderstandings. Likewise, you may benefit from the help of a colleague who knows an assay that you need to learn.

Before you enter into collaboration with a non-SMCB member, speak with me first and certainly refer the potential collaborator to me. Although it is not required that you speak with me before you make a request of materials from others, I prefer that you send me a draft of the request before you send it to the outside researcher. Requests by others for SMCB reagents must be discussed with me before they are distributed.

**TECHNICAL SUPPORT IN THE SMCB**

The SMCB has access to technical support in the form of ready-to-use buffers, media, pre-poured plates and gels, oligo DNAs, radioactive labeling services and other services. I would like to emphasize that the value of these is to provide you with more time to plan and execute experiments and to record and prepare your results for presentation. Sergei Gaidamokov is a very experienced biochemist and molecular biologist who takes direction from me and/or from a SMCB colleague with whom we have worked out a collaboration plan. In general, he has is own projects that he works on, in collaboration with me and/or another SMCB member.

**CAREER DEVELOPMENT**

Collaborating and networking are important for career development. So is your experience as a Fellow. You should expect to learn how to design and execute experiments, choose good problems to work on, choose good model systems to work on and make connections between different fields during your time in SMCB.

**Evaluation**

I evaluate all fellows regularly. Continuation of your fellowship into the second year and beyond is expected but not guaranteed, you must be an active positive contributor to our work. Extensions are approved on a yearly basis. A small number of fellows may continue their postdoctoral training beyond three years, and up to five years (or more) but only upon approval by extra-LMGR personnel and following an evaluation and review of your work. Fellows are expected to function with increasing independence over time, and to assume additional responsibility for our work. Increased independence should never be confused with a lack of accountability. We must all be accountable, always.

You should be aware that I am often asked to evaluate people before and after they leave our group, specifically by potential employers and fund granting agencies. It is not uncommon to be asked to rank a candidate in several categories. A typical "Reference Report Form" includes:

- Knowledge in the chosen field
- Motivation and perseverance toward goals
- Ability to work independently

- Ability to work as a member of a research team
- Ability to plan and conduct research
- Ability in oral expression
- Ability in written expression
- Imagination and probable creativity
- Communication skills.

They also ask for ranking, i.e., top 2%, top 5%, top 10%, top 25% of fellows, etc. It is helpful to keep these items, and your responsibilities, in mind during your training, and always to conduct yourself as professionally as possible.

**WORK HABITS; THE QUANTITY AND QUALITY OF LAB TIME**

In addition to providing training, the SMCB is responsible for maintaining a competitive research program whose progress is monitored regularly and funded according to its productivity. Everyone's efforts are of paramount importance to our success. The SMCB has been provided with funding and ancillary services to maximize the time available to fellows to conduct meaningful experiments. You should place high priority on optimizing your use of the resources to enhance your ability to generate results. The extent to which you achieve this will likely be *the most* important determinant of your success.

You should spend the majority of your time designing and executing experiments. A good strategy is to maintain two to three subprojects at all times so that during the idle periods of one, you can focus on the other. You will always need to make some reagent or to prepare for the next experiment.

You are expected to spend your time in the lab designing, preparing for or performing experiments, and discussing data in a professional manner. If you aren't busy, you may be distracting others in the lab. If you are away from the lab I will notice. I prefer that your schedule overlap with mine as much as possible, because this increases opportunities for us to communicate (I usually arrive by 8:30 AM and depart after 6:00 PM). I am sometimes available on the weekend, -just ask if you want to meet with me or need my help then. I often get much work accomplished on weekends and I will be glad to see you do the same. Your "work ethic" is one of the important questions potential employers will ask me as your supervisor. Use your time well, work efficiently, put in long and productive hours in the lab: strong efforts on your part will be noted most positively.

**NOTEBOOK—RECORD KEEPING more than a legal requirement at the NIH**

Devote a lot of time and attention to maintaining your laboratory notebook. Your notebooks will remain at the NIH even after you leave. They will be part of the official record of our work in SMCB. I expect the following:

- A daily record containing the month, day and year
- detailed information about your experiments
- pages must be numbered
- Your notes should be neatly written, clear, concise and rich with information (concentrated into one or two pages per experiment), in English.

Each experiment should have easily identifiable sections:

- Title or Objective
- Methods (e.g., flow chart or schematic, reaction components, etc.)
- Results (gel photo or statement of autorad result)
- Conclusions
- Suggestions for the next experiment (if applicable)

Ancillary material and notes (e.g., computer printouts, sequences, material inserts, technical information, order forms, etc.) may be kept as a separate record so as not to interrupt the flow of the daily experiments or clutter the primary notebook.

Keep one notebook for each project. I find that this improves readability and flow, and decreases confusion.

- Cross-reference to other projects as necessary
- Detailed information is an important part of the record and must be included as well as the raw data obtained
- Negative data must be documented and included.
- Daily research activities should be recorded as complete accounts of the experiments performed, e.g., reagents described with regard to the supplier and/or date generated if made by yourself or another SMCB member.
- I also ask that you summarize your results, in your notebook, in the form of a short paragraph or two, once per month.

For an example you are welcome to look at my notebook. I expect to look through your notebook, and I may on occasion ask you to submit it to me, so that I may examine it carefully. I should be able to find your experimental results on a particular project, read and follow your notes without difficulty. I truly believe that these are good practices that will benefit your research.

**SCIENTIFIC ADMINISTRATION & LEADERSHIP**

All fellows should develop experience with certain administrative aspects of science. For example, you should expect to help review manuscripts, both those generated in the SMCB and those from outside journal editors who ask me to review submitted papers. If your contribution is significant you will receive credit: either I will name you as a co-reviewer to the Editor or mention you in the Acknowledgements section of a SMCB manuscript. As with the section above about critiquing your colleagues' presentations, being able to point out weaknesses while identifying areas that can be strengthened, improved or expanded, are valuable skills for assessing written work.

**GRANTSMANSHIP:** The NIH/NICHD sponsor regular workshops designed to help postdocs apply for outside funding and develop their grant-writing ability. Career transition awards, supporting young investigators' transition to independent positions in academe, include NICHD's K22 award for intramural fellows and the K99/R00 grant established in the spring of 2006. You should let me know if you would like to apply for outside grant support, and I strongly recommend that you use available resources to develop your skills. You will need to include significant preliminary data in a grant

proposal and therefore should not expect to begin to write a proposal until you have been here for more than one year.

**MENTORING:** The ability to support the growth and development of less experienced scientists than you is an important feature of research life. Summer students at various levels of training have been a part of the SMCB throughout the years, as have yearly pre-IRTA (Postbaccalaureate) students. When feasible and when you are ready to accept responsibility to be a mentor, I hope to be able to accommodate you. This depends on space and resources.

**OTHER SKILLS:** The NIH Fellows Committee and the Pre-IRTA Committees both operate list-servs on the NIH global e-mail network. These groups offer programs in support of your professional growth, as does the NICHD Office of Education. You may also want to subscribe to the List-SERVS for the NIH RNA Club, Lambda Lunch, and Washington Area Yeast Club to be made aware of their seminar schedules.

Sincerely,

Rich Maraia

## Sample Compact from Laboratory of Dr. Trina McMahon for Graduate Students, University of Wisconsin-Madison

### Mentor-Mentee Contract

*The broad goals of my research program*

As part of my job as a professor, I am expected to write grants and initiate research that will make tangible contributions to science, the academic community, and to society. You will be helping me carry out this research. It is imperative that we carry out good scientific method, and conduct ourselves in an ethical way. We must always keep in mind that the ultimate goal of our research is publication in scientific journals. Dissemination of the knowledge we gain is critical to the advancement of our field. I also value outreach and informal science education, both in the classroom and while engaging with the public. I expect you to participate in this component of our lab mission while you are part of the lab group.

*What I expect from you*

Another part of my job as a professor is to train and advise students. I must contribute to your professional development and progress in your degree. I will help you set goals and hopefully achieve them. However, I cannot do the work for you. In general, I expect you to:

- Learn how to plan, design, and conduct high quality scientific research
- Learn how to present and document your scientific findings
- Be honest, ethical, and enthusiastic
- Be engaged within the research group and at least two programs on campus
- Treat your lab mates, lab funds, equipment, and microbes with respect
- Take advantage of professional development opportunities
- Obtain your degree
- Work hard—don't give up!

*You will take ownership over your educational experience*

✓ **Acknowledge that you have the primary responsibility for the successful completion of your degree.** This includes commitment to your work in classrooms and the laboratory. You should maintain a high level of professionalism, self-motivation, engagement, scientific curiosity, and ethical standards.

✓ **Ensure that you meet regularly with me and provide me with updates on the progress and results of your activities and experiments.** Make sure that you also use this time to communicate new ideas that you have about your work and challenges that you are facing. Remember: I cannot address or advise about issues that you do not bring to my attention.

✓ **Be knowledgeable of the policies, deadlines, and requirements of the graduate program, the graduate school, and the university.** Comply with all institutional policies, including academic program milestones, laboratory practices, and rules related to chemical safety, biosafety, and fieldwork.

✓ **Actively cultivate your professional development.** UW-Madison has outstanding resources in place to support professional development for students. I expect you to take full advantage of these resources, since part of becoming a successful engineer or scientist involves more than just

doing academic research. You are expected to make continued progress in your development as a teacher, as an ambassador to the general public representing the University and your discipline, with respect to your networking skills, and as an engaged member of broader professional organizations. The Graduate School has a regular seminar series related to professional development. The Delta Program offers formalized training in the integration of research, teaching, and learning. All graduate degree programs require attendance at a weekly seminar. Various organizations on campus engage in science outreach and informal education activities. Attendance at conferences and workshops will also provide professional development opportunities. When you attend a conference, I expect you to seek out these opportunities to make the most of your attendance. You should become a member of one or more professional societies such as the Water Environment Federation, the American Society for Microbiology, or the American Society for Limnology and Oceanography.

*You will be a team player*

- ✓ **Attend and actively participate in all group meetings, as well as seminars that are part of your educational program.** Participation in group meetings does not mean only presenting your own work, but providing support to others in the lab through shared insight. You should refrain from using your computer, Blackberry, or iPhone during research meetings. Even if you are using the device to augment the discussion, it is disrespectful to the larger group to have your attention distracted by the device. Do your part to create a climate of engagement and mutual respect.
- ✓ **Strive to be the very best lab citizen.** Take part in shared laboratory responsibilities and use laboratory resources carefully and frugally. Maintain a safe and clean laboratory space where data and research participant confidentiality are protected. Be respectful, tolerant of, and work collegially with all laboratory colleagues: respect individual differences in values, personalities, work styles, and theoretical perspectives.
- ✓ **Be a good collaborator.** Engage in collaborations within and beyond our lab group. Collaborations are more than just publishing papers together. They demand effective and frequent communication, mutual respect, trust, and shared goals. Effective collaboration is an extremely important component of the mission of our lab.
- ✓ **Leave no trace.** As part of our collaborations with the Center for Limnology and other research groups, you will often be using equipment that does not belong to our lab. I ask that you respect this equipment and treat it even more carefully than our own equipment. Always return it as soon as possible in the same condition you found it. If something breaks, tell me right away so that we can arrange to fix or replace it. Don't panic over broken equipment. Mistakes happen. But it is not acceptable to return something broken or damaged without taking the steps necessary to fix it.
- ✓ **Acknowledge the efforts of collaborators.** This includes other members of the lab as well as those outside the lab. Don't forget important individuals like Dave Harring at the CFL and Jackie Cooper at CEE.

*You will develop strong research skills*

- ✓ **Take advantage of your opportunity to work at a world-class university by developing and refining stellar research skills.** I expect that you will learn how to plan, design, and conduct high quality scientific research.
- ✓ **Challenge yourself by presenting your work at meetings and seminars as early as you can and by preparing scientific articles that effectively present your work to others in the field.** The

'currency' in science is published papers, they drive a lot of what we do and because our lab is supported by taxpayer dollars we have an obligation to complete and disseminate our findings. I will push you to publish your research as you move through your training program, not only at the end. Students pursuing a Masters degree will be expected to author or make major contributions to at least one journal paper submission. Students pursuing a doctoral degree will be expected to be lead author on at least two journal papers submissions, preferably three or four.

- ✓ **Keep up with the literature so that you can have a hand in guiding your own research**. Block at least one hour per week to peruse current tables of contents for journals or do literature searches. Participate in journal clubs. Better yet, organize one!
- ✓ **Maintain detailed, organized, and accurate laboratory records.** Be aware that your notes, records and all tangible research data are my property as the lab director. When you leave the lab, I encourage you to take copies of your data with you. But one full set of all data must stay in the lab, with appropriate and accessible documentation. Regularly backup your computer data to the Bacteriology Elizabeth McCoy server (see the wiki for more instructions).
- ✓ **Be responsive to advice and constructive criticism**. The feedback you get from me, your colleagues, your committee members, and your course instructors is intended to improve your scientific work.

*You will work to meet deadlines*

- ✓ **Strive to meet deadlines: this is the only way to manage your progress.** Deadlines can be managed in a number of ways, but I expect you to work your best to maintain these goals. We will establish mutually agreed upon deadlines for each phase of your work during one-on-one meetings at the beginning of each term. For graduate students, there is to be a balance between time spent in class and time spent on research and perhaps on outreach or teaching. As long as you are meeting expectations, you can largely set your own schedule. It is your responsibility to talk with me if you are having difficulty completing your work and I will consider your progress unsatisfactory if I need to follow-up with you about completion of your lab or coursework.
- ✓ **Be mindful of the constraints on my time.** When we set a deadline, I will block off time to read and respond to your work. If I do not receive your materials, I will move your project to the end of my queue. Allow a minimum of one week prior to submission deadlines for me to read and respond to short materials such as conference abstracts and three weeks for me to work on manuscripts or grant proposals. Please do not assume I can read materials within a day or two, especially when I am traveling.

*You will communicate clearly*

- ✓ **Remember that all of us are "new" at various points in our careers.** If you feel uncertain, overwhelmed, or want additional support, please overtly ask for it. I welcome these conversations and view them as necessary.
- ✓ **Let me know the style of communication or schedule of meetings that you prefer**. If there is something about my mentoring style that is proving difficult for you, please tell me so that you give me an opportunity to find an approach that works for you. No single style works for everyone; no one style is expected to work all the time. Do not cancel meetings with me if you feel that you have not made adequate progress on your research; these might be the most critical times to meet with a mentor.

- ✓ **Be prompt**. Respond promptly (in most cases, within 48 hours) to emails from anyone in our lab group and show up on time and prepared for meetings. If you need time to gather information in response to an email, please acknowledge receipt of the message and indicate when you will be able to provide the requested information.
- ✓ **Discuss policies on work hours, sick leave and vacation with me directly.** Consult with me and notify fellow lab members in advance of any planned absences. Graduate students can expect to work an average of 50 hours per week in the lab; post-docs and staff at least 40 hours per week. I expect that most lab members will not exceed two weeks of personal travel away from the lab in any given year. Most research participants are available during University holidays, so all travel plans, even at the major holidays, must be approved by me before any firm plans are made. I believe that work-life balance and vacation time are essential for creative thinking and good health and encourage you to take regular vacations. Be aware, however, that there will necessarily be epochs—especially early in your training—when more effort will need to be devoted to work and it may not be ideal to schedule time away. This includes the field season, for students/post-docs working on the lakes.
- ✓ **Discuss policies on authorship and attendance at professional meetings with me before beginning any projects to ensure that we are in agreement**. I expect you to submit relevant research results in a timely manner. Barring unusual circumstances, it is my policy that students are first-author on all work for which they took the lead on data collection and preparation of the initial draft of the manuscript.
- ✓ **Help other students with their projects and mentor/train other students**. This is a valuable experience! Undergraduates working in the lab should be encouraged to contribute to the writing of manuscripts. If you wish to add other individuals as authors to your papers, please discuss this with me early on and before discussing the situation with the potential co-authors.

*What you should expect from me*

- ✓ **I will work tirelessly** for the good of the lab group; the success of every member of our group is my top priority, no matter their personal strengths and weaknesses, or career goals.
- ✓ **I will be available for regular meeting and informal conversations.** My busy schedule requires that we plan in advance for meetings to discuss your research and any professional or personal concerns you have. Although I will try to be available as much as possible for "drop in business", keep in mind that I am often running to teach a class or to a faculty meeting and will have limited time.
- ✓ **I will help you navigate your graduate program of study.** As stated above, you are responsible for keeping up with deadlines and being knowledgeable about requirements for your specific program. However, I am available to help interpret these requirements, select appropriate coursework, and select committee members for your oral exams.
- ✓ **I will discuss data ownership and authorship policies regarding papers with you.** These can create unnecessary conflict within the lab and among collaborators. It is important that we communicate openly and regularly about them. Do not hesitate to voice concerns when you have them.
- ✓ **I will be your advocate**. If you have a problem, come and see me. I will do my best to help you solve it.
- ✓ **I am committed to mentoring you, even after you leave my lab.** I am committed to your education and training while you are in my lab, and to advising and guiding your career development—to the degree you wish—long after you leave. I will provide honest letters of evaluation for you when you request them.

- ✓ **I will lead by example and facilitate your training in complementary skills needed to be a successful scientist, such as oral and written communication skills, grant writing, lab management, mentoring, and scientific professionalism.** I will encourage you to seek opportunities in teaching, even if not required for your degree program. I will also strongly encourage you to gain practice in mentoring undergraduate and/or high school students, and to seek formal training in this activity through the Delta program.
- ✓ **I will encourage you to attend scientific/professional meetings and will make an effort to fund such activities.** I will not be able to cover all requests but you can generally expect to attend at least one major conference per year, when you have material to present. Please use conferences as an opportunity to further your education, and not as a vacation. If you register for a conference, I expect you to attend the scientific sessions and participate in conference activities during the time you are there. Travel fellowships are available through the Environmental Engineering program, the Bacteriology Department, and the University if grant money is not available. I will help you identify and apply for these opportunities.
- ✓ **I will strive to be supportive, equitable, accessible, encouraging, and respectful. I will try my best to understand your unique situation, and mentor you accordingly.** I am mindful that each student comes from a different background and has different professional goals. It will help if you keep me in formed about your experiences and remember that graduate school is a job with very high expectations. I view my role as fostering your professional confidence and encouraging your critical thinking, skepticism, and creativity. If my attempts to do this are not effective for you, I am open to talking with you about other ways to achieve these goals.

*Yearly evaluation*

Each year we will sit down to discuss progress and goals. At that time, you should remember to tell me if you are unhappy with any aspect of your experience as a graduate student here. Remember that I am your advocate, as well as your advisor. I will be able to help you with any problems you might have with other students, professors, or staff.

Similarly, we should discuss any concerns that you have with respect to my role as your advisor. If you feel that you need more guidance, tell me. If you feel that I am interfering too much with your work, tell me. If you would like to meet with me more often, tell me. At the same time, I will tell you if I am satisfied with your progress, and if I think you are on track to graduate by your target date. It will be my responsibility to explain to you any deficiencies, so that you can take steps to fix them. This will be a good time for us to take care of any issues before they become major problems.

# Working with Norman Ramsey
## A Guide for Research Students

Norman Ramsey
Tufts University

Summer 2011

## Goals

We want to write the best software and publish the best papers in the best conferences and journals. We want our stuff to be the stuff people will read five or ten years from now to learn how to build their own systems. And whether we do compiler construction, language design, productivity tools, run-time systems, type theory, or some other project, we want always to be focused on making the programmer's life better.

## Introduction

Agreements between junior researchers (undergraduate students, graduate students, and postdoctoral associates) and their faculty supervisor (me) are often implicit. But an implicit agreement is little better than no agreement. This document makes things explicit. Much may be common knowledge, but writing down common expectations helps prevent misunderstandings.

If you have been invited to join my research group or are already a member, please read the whole thing carefully. If you have questions or concerns, please talk about them; the document, like my research style, is a work in progress. I review this document periodically to make sure that my expectations and obligations are clear and that nothing important is forgotten.

In the spirit of full disclosure, I have tried to identify what's distinctive about working with me—both the good and the bad:

- Working with students and contributing to their professional development is the most rewarding part of my job. My ideal is to help *students* develop into *colleagues*.
- I am ambitious and have high standards, and I expect the same from you.
- I can be disorganized, and you may have to compensate. You must always know what you're working on and what the plan is. If you don't know, ask.

- You can take on as much responsibility as you want. I hope that even students who start out doing "only" programming[1] will eventually become skilled researchers, who can identify important problems, solve them, write about them, and present them to a technical audience. To that end, I seek opportunities for you to travel, publish, and present.
- I can be obsessive about precision.
- I use a sophisticated mix of software tools and programming languages, and I expect you to do so as well.
- As a senior professor, I have many other calls on my time—from classroom teaching to curricular planning to helping run the university. Compared with a more junior professor, I am more skilled and better connected, but I have less time for you and more distractions to contend with.

  External commitments have made me skeptical about new technologies. If I'm lucky, I can afford to master about one new technology each year.

## What's it all about?

This section gives some of my perspectives on research and research students. Graduate students undertaking doctoral study are here to learn to become independent researchers—as soon as possible, you, not a manager or a supervisor, will decide what is the best use of your abilities. Undergraduate students are more likely to be sampling research as one of a number of activities. In both cases, doing research under the supervision of a faculty member offers an opportunity to develop advanced skills while contributing to improvements in engineering and technology. Here are some of the elements:

- Although a doctoral student may begin with an "immigration project" in which he or she works for me, my goal is that each doctoral student should, as quickly as possible, be working for himself or herself, to advance his or her own professional goals.
- You must be aware of the research literature related to your project. Beginning students can expect substantial help from an advisor, but if you are undertaking a PhD, you, not your advisor, will be the expert on the literature.
- To be successful, research must be documented. In the excitement of the moment it is easy to forget or omit vital details. *Contemperaneous* notetaking helps you remember, organize, and communicate your results. You must keep a notebook.

[1] As if that were easy.

- Graduate research requires full-time dedication and year-round effort.[2]
- The field progresses only when good work is published. Publications are also a universally acknowledged sign of personal success. Writing for publication is an essential part of the graduate research experience; a typical dissertation will be connected to several submitted papers. In computer science, publication often includes the opportunity to give talks at conferences.
- Undergraduate students are not required to write for publication, but if you want to try your hand, I offer every encouragement, including paid travel to conferences at which you can present a paper.
- The best researchers, although independent, don't hesitate to get advice from others, especially in areas in which they are not the world's experts. Even if you are just starting, take initiative and discuss ideas and problems with other students and faculty, not only within Computer Science or within Tufts, but also outside. In my field, programming languages, we are lucky to have world-class colleagues at several local colleges and universities.

## Postdoctoral study

If you've completed your doctorate, the world assumes that you have the basic skills of a researcher: to identify and solve significant problems. Why do a postdoc?

- If your ultimate career goal is to become a professor, a postdoc offers you an opportunity to *spend time doing only research*. You can spend one to three years solving interesting problems without worrying about teaching, advising, or committee work. If you want, you can even be insulated from writing proposals.

  I encourage you to view your postdoctoral years not necessarily as a time to improve your publication record, but as a time to *develop intellectual capital* that you will draw on for the first several years of your next position.
- No matter what your ultimate career goal, a postdoc offers you an opportunity to *learn new ways of doing things*. You can use a postdoc to learn new experimental techniques, new tools, new ways of thinking, new ways of teaching, new ways of running a research group or a department, even a new country and culture. A good postdoc should be an enriching

[2] Part-time PhD study is possible but can be ten times more difficult than full-time study, especially during the crucial final year of writing the dissertation. I am willing to work with part-time PhD students, but only those who demonstrate unusual maturity and ability to master new skills.

experience, and you should leave with lots of new tools in your intellectual toolbox.

I have two primary expectations of postdocs:

- You must contribute to the research mission of the group. This means doing good work and publishing it. There should be a plausible relationship between your work and your source of funding.
- You must take responsibility for the success of your postdoc. Only you know what you want to take away, so only you can set goals and priorities. My job is to assist you every way I can.

## Basic work rules

I expect good work habits, organization, and time management.

- Working at odd hours and in odd places is more common than a regular schedule. But to create opportunities to interact with colleagues, I expect everyone to spend *some* regular time in the lab—at least several hours each weekday. Many people in our group prefer to work by themselves in the morning (e.g., on writing) and to work interactively in the afternoons. Some remote work (telecommuting) is acceptable, but you must also spend time in the lab so you can interact with others. *Part of your job is to be in the lab and talk with other people about your research.*

  This short blurb may give you some insight why facetime in the lab is so important:

  > I wonder how an English professor would feel spending a week in a physics lab. Not about the scientific work, but about the frequent, ongoing interaction between students and peers, postdocs and faculty. Scientists see each other in the lab, if not daily, then at least weekly. They have frequent lab meetings, colloquia and interaction with scholars at other universities around joint research. During my graduate training in psychology at McGill University, especially in the research lab at the Montreal Neurological Institute, I spent hours hanging around the postdocs. I learned at least as much from them as I did from my interactions with my professors. The expectation was that I would be at the lab 9 to 5 or more, every day. I saw my adviser every day.
  >
  > — Gina Hiatt

  Ideally, my group has a short briefing every Monday through Thursday from 11:45 to 12:00. (I have a sleep disorder which sometimes makes a daily briefing impossible.)

- I discourage "death from overwork," but at certain times (when conference or grant deadlines approach, or when a project's goals are not being met), I expect extra time (evenings, weekends). After a crunch, compensatory time off is not only acceptable but recommended.
- If you are an undergraduate student and you are working for me part-time, please figure out how much time you can commit. We will review your commitment every semester. If you find yourself overcommitted, please squeeze out a few hours so your work can be handed off to someone else, not lost. Remember, it is always possible to leave a project with honor, but it is never honorable to disappear without a word.
- If you are a graduate research assistant, plan doing some work on your projects between semesters and during long academic breaks.
- If you will need time off, please discuss it with me in advance.
- Make sure I have your current phone number and email address.
- If special circumstances require you to miss work, let me know.

## The practice of research

The key principles are to know *what you have done*, to know *what you plan to do*, and to know *what is going on around you*.

**Research meetings** There are many kinds of research meetings.

- In an individual meeting, you meet with a supervisor or supervisors. Such a meeting is a good time to get some opinions about your new ideas, to get help with problems, and to communicate with your supervisor about progress.
- Project meetings may involve several people working on the same schedule. They usually involve planning and status reporting. This may be a good time to let other people on the same project know what you are doing.
- Group meetings may involve one or more research groups with researchers at all levels of seniority. They are a good way to develop broad ideas about what people are doing and where the field is going. They may also present opportunities to develop important skills, such as presenting work in front of groups. Finally, group meetings help build a sense of community.

Here are some suggestions for "best practices" for research meetings.

- Know when the next meeting is.
- For an individual meeting with your supervisor, it is a fine idea to bring a *written agenda* the meeting. Have ink on paper.

- *Ask questions* during meetings. Don't take something on faith just because the person who says it is more experienced.
- *Take notes* during meetings. If you need time for notes, ask participants to slow down.
- After a project meeting or a supervisory meeting, use your notes to *write down your understanding of the decisions made at that meeting.* As well as any decisions made, be sure to cover your *plan of work* for the time until the next meeting. When you have finished, *email your summary to me* for confirmation.

  Post-meeting email is difficult for people to carry off. I keep pushing it for two reasons:

  - By writing things down, you will clarify your own thoughts about your plans. You will also get a chance *immediately* to get help tying up loose ends or solving mysteries. You might otherwise have to wait for the next meeting to get this kind of help.
  - You create a permanent record of what you've been working on. This permanent record helps me write you a great letter of recommendation. By drawing on specifics from your emails, I can write a far stronger letter than the typical "Mary is a really bright student and you should hire her."
- I enjoy meeting with students, and I work with my door open. Please drop in for a spontaneous meeting at any time, excepting only if my door is shut. If I am too busy to meet, I will chase you away.

**Records**

- Get a *lab notebook* to keep a permanent record of your work, about which more below.
- Maintain an *annotated* bibliography of references useful to your project. BibTEX can be helpful here.
- If you borrow a book from me, *leave a trail*: sign it out.

**The lab notebook** This is how I expect you to use your notebook:

- Every time you work on your project, write in your notebook the date and time and what you did. (If you are being paid an hourly wage, you have to keep track of your hours anyway.) Even a single sentence provides a useful record.
- If you take experimental measurements, write them in your notebook.

- Your record should include things that failed as well as your successes. Write down what it was that didn't work; you may save someone else many hours.

  You should definitely write down big things that don't work, and it may even be worth writing little things that don't work. If it's a good idea for Don Knuth, it might be a good idea for you. (See "The Errors of TEX," *Software—Practice & Experience*, 19(7):607–685, July 1989.)

- Your notebook is a good place to keep records of test inputs and outputs, transcripts, screen dumps, etc. Print them out and tape them into your notebook. In some ways, a notebook is better than a demo, because there's a permanent record.

- You may also find it useful to use your notebook to sketch ideas, observations, measurements, proofs, code, solutions to problems, or whatever. Put these things directly into your notebook, not on scraps of paper to be transcribed later. Go wild; notebooks are cheap.

- Don't let the dog eat your notebook.

**Professional interactions**

- Be aware of what others are doing, both in the group and out. This knowledge and habit will serve you well throughout your career.

- Offer your experience to help others.

- Seek the experience of faculty and other students to help yourself.

- Be active at meetings and conferences. *Ask questions.* Do so respectfully, concisely, and often.

- Review manuscripts, both within the group and outside. (This activity is optional for undergraduate students.) I will provide guidance.

**Good citizenship** I expect everyone to work together to identify and solve problems.

- When we review code, I expect everyone in my group to participate, even if the code is not directly related to their project.

- If you see a need, find a solution. I will help you implement it.

- I may ask you to undertake service work for the group or for our department.

**Remote work** There are times to work remotely and times not to. We all benefit by having a group of people we can talk with about problems. If we are all sitting quietly in our rooms, we lose the benefits of those interactions. But at times it can be better to work alone, without interruption.

Some hints:

- You can do background reading anywhere.
- When you're trying to understand a problem and sketch the shape of the solution, discussions are invaluable—especially when the people around you have their fingers on the same topics.
- Once you've reduced something to programming, you can do that anywhere you have a computer—but programming is difficult, and you'll do a better job faster if you talk with people about what you're programming.
- My time is chopped up into small pieces. If I unexpectedly get twenty minutes free, it goes to a person who is in Halligan.

## Group and departmental citizenship

Good citizenship is valuable not only for the research group but also for the department. Please don't hide in your office; get out and meet people at group and departmental events. Everyone should attend one group event per week, and everyone should consider attending departmental colloquia.

- *Lunch.* Faculty, especially Tufts faculty, tend to sit in their offices and work through lunch. You should discourage this tendency by inviting faculty to have lunch with you (brown bag or an excursion).
- *CS colloquium (Thursday afternoon).* The Computer Science colloquium is held every Thursday from 2:50 to 4:00 in Halligan 111. Refreshments are served at 2:50 and the talk starts at 3:00. A good colloquium is a great opportunity to broaden your education by learning new things from people who aren't normally here. A colloquium that is not so good can at least teach us something about how not to give a talk. If a colloquium talk is too specialized for a general CS audience, it is a good idea to complain to the host!

  For undergraduate students, there is probably not much benefit in going to every colloquium: the talks tend to assume a solid undergraduate knowledge of computer science. But do keep an eye on the speakers, and if you see a talk that looks interesting, come.

  For graduate students, it's not always obvious why you should go to colloquia. The benefits are primarily long-term and indirect.

  – You build up some nontrivial knowledge in a broad set of areas in computer science, including many areas in which you may never do

research. This kind of breadth won't matter much while you're in graduate school, but it will become terribly important when you start looking for your first job. Especially if you are looking for an academic position, you will have to talk to many members of hiring committees who are not in your area. If you can talk with them about their own areas and can get excited about some aspect of what is going on there, they will be much more likely to want you to come.

- When colloquia are full of people listening and asking good questions, it helps visitors learn that there is a vibrant CS community here. Building Tufts's reputation helps everyone and ultimately increases the value of your degree.
- It probably won't happen very often, but every so often you'll get a good idea from a completely unexpected direction.

If a colloquium is given in an area in which you have a research interest, sign up to meet with the speaker. Most speakers enjoy meeting with students, and faculty from other institutions are always thinking about recruiting. If some visiting senior person comes in and asks you about your work, don't be shy! Explain what you're doing and why, *use the whiteboard*, be clear, and you'll be remembered during interview season.

## Software tools

My group uses software tools and languages aggressively.

- *Literate programming* is essential for any software that more than one person will work on, or that will outlive its author's tenure with the group. I naturally prefer the Noweb tool, but nuweb, CWEB, FunnelWeb, and other variants may be acceptable.

  Noweb code should be *at most 88 columns wide* so the output can be printed. Blank lines inside a code or documentation chunk can be Good, but blank lines around a code or documentation chunk are Bad.

  `http://www.cs.tufts.edu/~nr/noweb`

- All work should appear on a server that is backed up *nightly*. The Unison file synchronizer can be used to keep a server consistent with a laptop or a personal machine at home. Another option is to keep all your work in a Git repository on the file server, and to push daily.

  `http://www.cis.upenn.edu/~bcpierce/unison`

- Sources, documentation, test scripts, and everything else edited by human fingers should be kept under source control. In 2009 and 2010, we experimented extensively with CVS, Subversion, Darcs, Mercurial, and Git. We've settled on Git, and you will need to learn it. It is a terrible tool, but the others are worse. *Code you commit to the* `master` *branch of a*

*shared repository should compile and pass regression tests.*

`http://www-cs-students.stanford.edu/~blynn/gitmagic/`

Commit and push your work often—if possible, every day. (If your code is experimental or broken, *create and push a new branch*.) If you don't plan to commit and push, it's easy to let a whole semester go by without committing your work. If other people don't see the work and can't use it, there's less chance of it being carried on after you go.

- To build internal software, we use `mk`. For external distributions, we use `make`. Makefiles must be simple; GNU Make is not an acceptable alternative. GNU autoconf is evil and wrong.

  `http://swtch.com/plan9port/unix/mk-with-libs.tgz`

- For building tools written in Standard ML, we have an uneasy truce with SML/NJ and its Compilation Manager, which we extend as needed. We prefer Moscow ML and MLton, but for large programs, they aren't always practical.

- We use LaTeX and BibTeX for documents.[3] God help us.

- I encourage you to use `nbibtex` (`http://tinyurl.com/685y7r`), which helps work around the sheer ornery arbitrariness of standard bibtex keys.

- Standard ML code should use the capitalization conventions of the SML '97 initial basis:

  | | |
  |---|---|
  | `all_lower` | for types and type constructors |
  | `ALL_CAPS` | for signatures and datatype constructors |
  | `mixedLower` | for functions and values |
  | `MixedUpper` | for structures and functors |

  Never use `open`.

- Objective Caml code should use the Caml capitalization conventions:

  | | |
  |---|---|
  | `all_lower` | for types, type constructors, functions, and values |
  | `ALL_CAPS` | for signatures (normally just `S`) |
  | `Capital_words` | for structures, functors, and datatype constructors |

  Objective Caml code avoids identifiers with `InternalCapitals`.

  As in Standard ML, never use `open`.

- Haskell conventions are so far Out There that I have only this advice: your code must compile without warnings, and pattern-match warnings should be turned on.

[3] The "Collection of Computer Science Bibliographies" is a useful source of BibTeX entries.
`http://liinwww.ira.uka.de/bibliography`

- C code should be strictly ANSI conforming, without `#ifdef`. Naming conventions should be those of Hanson's *C Interfaces and Implementations*. Any consistent and readable layout style is acceptable. Major builds should be tested with all available C compilers (e.g., `gcc`, vendor's `cc`, and `lcc`).

- Our scripting languages of choice are `ksh` and Lua. We also tolerate `sed` and `awk`. Bash, Javascript, Python, and Ruby are strongly discouraged; Csh, Perl, and PHP are not acceptable. (I've experimented with all these alternatives, and I will be happy to discuss my thinking. It boils down to a combination of expressive power, ease of learning, and longevity.)
  `http://www.lua.org`

- As our development environment, we use Debian Linux. It enables us to use a huge range of tools without creating a systems-administration nightmare. You may be able to get by with a derivative such as Ubuntu. At minimum, you will want to learn package-management tools. I use `aptitude`, which has a confusing user interface, but it does a good job of updating your machine without breaking it. If you want, I can give you a short tutorial.

## Authorship

Authorship is the most important form of credit in the academic world. All researchers employed in whatever capacity should be able to expect authorship credit for their contributions. Here, in no particular order, are some thoughts about authorship.

- For a student working on a project under my guidance, I expect that the typical case is that we write a joint paper with the student as first author. I expect such a student to put in substantial work on the manuscript as well as the project.

  I have worked with students who identified and solved problems on their own, with little or no technical support from our research group or our shared infrastructure. When this kind of work is submitted for publication, the student is the sole author—even when I advise the student, it would be inappropriate for me to be a coauthor.

- For a major group project that spans several years, students or others may make significant contributions without taking on major responsibilities for the project. Most often these contributions take the form of implementation work. It is important that these contributions be recognized with authorship credit, but such authors will typically be listed last.

- A student who joins a project already in progress might or might not wind up as a coauthor—it depends on the contribution the student makes.

- When two or more people share major responsibility for a project or a paper, it is usually obvious who should be the "senior" author, i.e., the first-named author. If it is not obvious, it falls to the junior or second-named author to make this clear, e.g., by saying "I think you should be the lead author on this paper."

- If other things are equal, when a junior person works with senior people, the junior person should be the first author. When faculty work jointly with a student, the student should be first author unless there is a good reason otherwise.

- Don't overlook past contributions of someone who has moved on to another lab by the time a paper is submitted; such people still deserve authorship credit. I have been on both ends of this mistake, and it is one people remember for a long time.

## Undergraduate research can be different

If you're doing summer research for pay, then you're a full-time researcher, like a doctoral student only with less experience. But if you're doing a senior honors thesis or an independent study, strange things happen: you have a hard deadline, and when the deadline arrives, you've earned a grade.

Because undergraduate research stops when school is out, we rarely have the luxury of judging a final outcome. So the *process* matters. I consider these questions:

- When we meet, have you made progress since the last meeting?

- When you have made no progress, do you cancel meetings so as not to waste our time?

- If you think you have solved a problem, can you write a description of your solution in clear English?

- If you write some implementation, is it fit to be read by another person?

Outcomes, even if not final, count heavily in your favor:

- Have you solved any interesting problem?

- Have you created a piece of software that either embodies a solution to an interesting problem, or that advances the community's infrastructure to a point at which someone else might use it to solve an interesting problem?

- Have you mastered an intellectually coherent body of knowledge with which you were previously unfamiliar?

By these criteria, you can rate very high without actually having solved any of the problems you started out with.

Past students I've worked with have fit one of two scenarios:

- The answers to all the process questions were positive, and there was at least one positive outcome. These students earned A's.
- The student disappeared for most of the term and reappeared a week before the deadline, bearing a document. When confronted with the F he had earned, the student actually did some work. The student earned a D.

I can imagine various intermediate scenarios, e.g., you solve an interesting problem by week 5 and then disappear. Or worse, you claim to solve a problem and nobody can understand the solution. But I don't worry about these unlikely scenarios.

## The life of the doctoral student

If you're a graduate student, you'll spend some time adding depth and breadth to your knowledge of computer science, but the main thing you're here to do is become a researcher. A good researcher needs three critical skills:

- To solve a problem that has never been solved before
- To identify what new problems are interesting enough to be worth solving
- To describe a problem and its solution clearly and convincingly, both in speech and in writing

A big part of my job is to help you find opportunities to work on problems, to talk and write about them, and to watch other people doing the same.

**Working on and identifying problems** Most strong faculty candidates seem to have worked on about three different projects.

- When you first come in, we'll try to find you an "immigration project" where we see a clear problem and have a pretty good idea what the solution looks like. This might be a small problem we have a kicking around or a larger one on which work is already in progress. With luck, this problem will get you a quick taste of research and a publication.
- After an immigration project, different students take different paths. If you know what you want to do next, great. If not, we'll hunt for a problem that looks interesting, where we believe a solution exists, for which you can take primary responsibility.
- The final stage is for you to find your thesis problem. Finding a thesis problem is, in my opinion, the most difficult part of graduate school. Finding a good problem is always difficult, but for a thesis problem, there are special constraints. Although we don't have to know what will come out, we have to be confident that *something* will come out. You have to do

something solid relatively quickly (e.g., two years), but your thesis work should also be in an area you can continue to work on for several years afterward.

To identify good problems, I rely heavily on my peers in the research community. Whenever I travel to give a talk or go to a conference, I find lots of people to talk about ideas. By hearing others' ideas and talking about my own ideas, I develop my sense of what people think is interesting. You will learn to do the same—it is an important reason to go to conferences.

**Speaking and writing** When you look for your first job, and later if you try for tenure, you will be known by your conference talks and your published papers. When I prepare a talk or paper, I remember that there will be people out there who will know me *only* by that one talk or paper. (This approach is one reason I publish comparatively few papers. I try hard to get them in the best places, because I've found it is almost as much work getting a paper into a small workshop as a top-flight conference.) Especially in the systems areas, Tufts has relatively few resources to help you prepare talks and papers. One resource is a course I sometimes teach called *The Engineering Method of Technical Writing*.

- In programming languages, Tufts has too few students and faculty to sustain a strong weekly research meeting with talks. This situation should improve in Fall 2013, when Kathleen Fisher arrives.
- When a student gives an external talk (conference, workshop, visit, or whatever), we start by working together on the presentation. The next step is a focused practice talk with detailed feedback. We also invite selected people from other groups at Tufts. These practice sessions can be grueling but invaluable.
- On my web page, I've collected some suggestions about preparing and giving talks.
- For questions of style and usage, I turn to the *Chicago Manual of Style* and to the fine books by Fowler (*Modern English Usage*, in the *second* edition, not the third) and Garner (*Modern American Usage*). Every writer has pet peeves; my primary peeves are that I insist on the correct use of the hyphen and on author-date citations. I also frown on the use of the word 'this' as the subject of a sentence.

## Sponsored research

Funding for research students (as well as my summer funding) normally comes from "sponsored research." This category typically includes grants from government agencies like the National Science Foundation, contracts with industry or with agencies like DARPA, and the occasional outright gift from industry.

Different agencies want different things in return for their money. DARPA, for example, often wants software, documents, and other "deliverables" as well as command performances at conferences and other meetings. I try to get most of our funding from NSF, because what NSF wants is topnotch research results, pure and simple.

Part of your job as a research student is to help make sponsored research successful. Ronald T. Azuma has written at length on this topic, in his essay "So long, and thanks for the PhD!," and I quote him here.

> Academia is a business, and "graduate student" is a job title. This is especially true at private universities. Academia is very peculiar type of business. It is certainly not the Real World and does not work in the same way that the ordinary corporate world does. However, it is a business nonetheless and as a graduate student, you must treat it that way. Graduate school made a lot more sense and became much easier for me after I realized this. If you think of graduate school as an "Ivory Tower" free of politics, money problems, and real-world concerns, you are going to be severely disappointed. If you don't believe me, read *The Idea Factory* by Pepper White for one account of graduate life at MIT.
>
> A few graduate students are independently wealthy or have fellowship and scholarship money that cover all their expenses for their total stay in graduate school. Such students are rare, however. Most of us needed financial support, in the form of Teaching Assistantships or Research Assistantships (RA's). In general, RA's are more desirable to students since those can directly fund the research you need to finish.
>
> Where does the money come from to fund RA's? Your professors have to raise funds from external organizations. These include government agencies such as the National Science Foundation (NSF), Defense Advanced Research Projects Agency (DARPA), the Office of Naval Research (ONR), and others. Private companies also fund some university research, although this tends to be less common, in smaller amounts, and in the form of equipment donations. These organizations don't just give money away as charity. They expect their money to accomplish something. Increasingly these days, this takes the form of a contract for a working demonstration that must be shown at the end. That means once the money is delivered, your professors must come through with the working demonstration. It is rare that they do this by themselves. Instead, they find some very capable, young, self-motivated people who are willing to work long hours for small amounts of pay. In other words, they fund RA's.
>
> The RA job is crucial to the academic business. If the RA's cannot successfully conduct the research, then the demonstration will not work in the end and the funding agencies may not be happy. They

may choose not to fund your professor in the future, which will bring his or her research program to a halt. And there are many professors and other researchers chasing too few research dollars these days; it is a competitive market. Thus, each professor wants the best students available. These students are the most capable ones who can get the research done required to fulfill the funding contracts.

That means you must treat an RA like a job. You must prove to your professors that you are capable of getting the work done, being a team player, communicating your results, and most of the other characteristics needed to do well in regular jobs. That's why many of the upcoming sections in this guide sound like ones written for the regular workplace.

What do you get out of this? At the start, you may have to do tasks specifically related to the funding contracts. But eventually your professor must be flexible enough to fund your own specific research program that leads to the completion of your dissertation. Your stipend and tuition waiver should be enough to live on frugally without going into debt. You will learn the state of the art in your chosen speciality and conduct cutting-edge research on a subject that you find interesting and enjoyable. If you don't find this compensation sufficient, then you shouldn't be in graduate school in the first place.

The bottom line: realize that academia is a peculiar kind of business and the role you play in this enterprise. If you do your job well (and have good negotiation and interpersonal skills, as discussed in future sections), both your needs and your professors' needs will be met. But don't enter an RA position thinking that the computers, research equipment, staff members and other resources that you are provided with are your birthright. Don't take them for granted! Most of those exist only because your professors have been able to raise the money to provide those to you. In turn, you must fulfill your end of the deal by doing great research with those resources. If you don't do your job well, don't be surprised if your professors choose not to fund you in the future. They do not have to provide you with an RA job or let you use the computing equipment they acquired. And the student who has no funding, no tuition reimbursement and no access to required computing resources is the student who leaves the university that semester.

## My responsibilities as advisor

**Funding** I cover wages, stipend, or salary, and also materials, travel, publication fees, etc.

**Project definition** I help with

- Goals and relevance
- Time span
- Approach
- Initial set of references for bibliography

**Work environment** I provide space, equipment, computer accounts, software, etc. I will also provide pizza to anybody who is working late in the lab and gets hungry. Just send me the bill.

**Guidance** I will

- Schedule a regular meeting with you, typically weekly or biweekly.
- Be available for unscheduled meetings and to help with software problems in the lab.
- When new skills are needed, teach them, find other instruction, or develop a plan for self-teaching. Follow up to check that skills were learned.
- Help plan experiments, coding, testing, and path of project.
- Discuss results and analysis.
- Help over roadblocks.
- Constructively criticize writing and presentation skills as part of professional development.
- Evaluate your work thoroughly and carefully.
- Encourage when things go badly; praise when things go well.
- Criticize only actions, not people.
- Require challenging goals to be set and met.
- Help frame questions, and give you opportunities to find answers.
- Give you experience in interacting with sponsors.
- Help you prepare for qualifying examinations.

**Publication** I will

- Suggest when and where results should be published.
- Provide opportunities to present results at national meetings.
- Outline papers with you.
- Correct or make suggestions about drafts — critical review.
- For undergraduates, write draft of paper (if desired).
- Help you respond to reviews of submitted papers.

**Proposal, thesis, or dissertation** I will

- Provide time and schedule for writing
- Critique student outline
- Critically review drafts
- Help form committee

**Preparation for permanent employment** I will

- Give you a view of the financial and administrative sides of research
- Help with job-hunting
- Write letters of recommendation[4]
- Nominate you for appropriate awards and fellowships

## Completing a thesis on time

When you write a thesis to earn a degree, the University imposes deadlines. *The real deadlines are earlier.*

- If you are completing a senior thesis, your committee must have it ten days before the University deadline.
- If you are completing a doctoral dissertation, your committee must have it three weeks before your scheduled defense.
- If you are revising a doctoral dissertation (post-defense) to meet a degree deadline, you must present the revised version for approval at least one week before your final copy is printed for binding. If your dissertation requires substantial revision, your committee or I may require longer to review the revisions.
- The arrival of a thesis or dissertation to review must not come as a surprise—let people know well in advance when they should expect to receive your manuscript.

## Proposals

Whether it is required or not, a thesis proposal is a fine idea. A thesis proposal can head off potential problems and avoid having a student invest lots of time in avenues of exploration that have low probability of paying off—or that have already been explored by someone else. A review of the proposal should also keep you from biting off more than you can chew. When a proposal is approved, it typically binds the faculty supervisor and committee, *not* the student. That

[4]If you are a graduate student, I will not write a letter for you until I have seen the first draft of your thesis. This policy protects you from trying to finish a thesis on an impossible deadline, and more importantly, it helps ensure that when you go onto the job market, you are properly prepared.

is, if you do everything in your proposal, we promise to grant you your degree, *but* it is often not necessary for you to do everything in your proposal in order to earn your degree. As you undertake the research you may well identify more interesting problems or solutions that result in an even better thesis than the one you proposed—or you may find that a problem you proposed is intractable, while a related problem yields interesting results. These are acceptable outcomes; it's all part of doing research.

## The arc of the doctorate

One of the less comfortable parts of being a graduate student is the expectations are often unclear.[5] The expectations are unclear for a reason: the strongest influence over your doctoral study is the interaction between you and your advisor—but no two students are alike, no two advisors are alike, and no two doctorates are alike. But there is common ground.

- As you begin your graduate studies, you're still taking courses, and you're not really a doctoral student yet.
- Like most advisors, I expect you to get involved in research as soon as possible, and not to be distracted by trivia like course requirements and qualifying examinations.[6]
- As a doctoral student, you will become a relatively senior member of a small learning community. Rank has its obligations as well as its privileges: I will expect you to mentor younger graduate students and undergraduate research students. You may even be asked to help in the classroom.
- Facetime with me will vary depending on circumstances. At the beginning of your graduate career, you will get regular meetings and close supervision. As you get more experience, you will get more independent. You can expect extra help around the time of your qualifying exam and thesis prospectus, but the general rule is that after your first project, you'll get less time with me. (I'll probably be spending that time with a more junior student.) Then finally, as you complete your dissertation, your work will become a high priority—within six months of finishing your dissertation, you have the first claim on my research time.

  Against this background, there can be big fluctuations. When you come up with something good, your facetime with me skyrockets. And when I am shackled to a large required course, your facetime with me may plummet.
- How much is enough? Part of the answer depends on your career goals. In the aughties, candidates for interviews in academic or industrial research positions had *at least* three publications in top conferences like

[5] Don't worry. After you graduate, expectations will be even less clear.

[6] When you are wrestling with your dissertation, you will agree that the qualifying exam is trivial by comparison. Or I will be the one buying dinner.

POPL, PLDI, ICSE, and ICFP. If you build that kind of publication record, you will have plenty enough for a dissertation.

If you're not aiming for a top position after graduation, I still expect you to produce enough externally visible work to help support the students who will come after you, just as your work will have been supported by students who came before you. A good rule of thumb is to produce two publications in top conferences. Workshops and journals are OK, but our aim is quality, not quantity, and if all of your work is published in second-tier venues, something is wrong. Our goal is not to publish as many papers as possible; it's to do great work.

## It's fun to have fun, but you have to know how

Research is hard, and graduate study is hard. Most faculty do a pretty good job of eliminating gratuitous difficulty, but most of the difficulty is an essential part of the enterprise. It is intrinsically difficult to do something that's never been done before, to achieve results that will matter to other people, and to explain those results so that others can understand them. You will work hard to become better and better at something that matters. I will work hard to help you find that something and to help you become great at it. To sustain yourself through difficult times, find research that means a lot to you. Successful researchers find interesting problems and fall in love with them. In operational terms, some Friday nights should be spent having fun out in the world, but if you aren't also spending some Friday nights having fun with your research, you're not doing the right research.

Welcome to the J lab at NIH. In this memo I set out to describe my expectations of myself as a mentor and you as a part of the project and lab. Some elements are simply practical 'dos' and 'don'ts' but many touch on the issue of collaboration and team science.

My goal as a mentor is to support and empower each team member to articulate and achieve his/her goals within the team's vision. As a mentor, I am committed to helping you to develop scientific skills and learn the nuances of this field of research. I strive to help you achieve success along your chosen career path through assisting with networking, identifying opportunities and tackling complex scientific question. Most often I can do this by assembling the resources and sharing the formative successes and failures I (and others) have faced along the way. I may or may not be the right mentor to you at every stage (due to my own professional and academic limitations), but I will try to be a resource for identifying others who can help guide you in that role.

1. Lab and branch meetings
    - Lab meeting is every other Tuesday at 1 PM in the conference room for approximately 1.5 hours year round. This is an informal meeting in which people 'open up their notebooks' and talk about what they've worked on since the last meeting. It's also a great time to bring analyzed data and discuss how to visualize the central findings. Admittedly, most people use powerpoint slides at this point to guide the discussion. The lab meeting schedule is posted on the lab server, along with upcoming meetings and my travel dates. At lab meeting, I will discuss hiring decisions that are in progress; e.g. potential post-docs, students. I will also let you know about my upcoming deadlines – proposals, talks. This is a private meeting and everything discussed here is considered in confidence. Attendance is mandatory – if you are running over or have a conflict on a particular day, let me know.
    - Branch meeting is held Fridays at 12 noon in the first floor conference room for 1 hour September through June. This meeting consists of the 6 labs within our branch in this building. This is a more formal meeting in that people have prepared presentations that often use PowerPoint. However, the ideas presented can vary from initial findings to paper in press. Typically, there are 2 presentations that each last 25 minutes with 5 minutes of questions. Post-docs are expected to present their data at least once a year, but you do get a pass for the first six months you are here. If you run over, expect to be interrupted. There is a sign up sheet posted in August and January to sign up for the next 4 to 6 months and one postdoc in the lab (currently X) is the lab representative to the committee.

2. NIH meetings and seminars
    - Institute-wide retreat (no travel, held on campus): Occurs in the fall, November or December. The lab has the opportunity to present 2 or 3 posters/year. Depending on your start date, you typically do not present your first year. The format of the retreat is in flux due to budgetary constraints.
    - NIH Seminars: There are a lot of seminars that occur are sponsored by our institute and NIH-wide. Pace yourself. I would encourage you to attend institute seminars (every other XXday @ X PM) and relevant or interesting seminars that occur on campus, including NIH Director's seminar (Wed @ 3 PM). NIH maintains an online

calendar of events. If you would ever like to meet one of the Institute/NIH speakers, there is typically a contact person listed for the talk. And ask me – because I might have a slot that I can share. It's very hard to get on the NIH Director's seminar speakers calendar, but there is a reception after the seminar.

- NIH Research festival: Occurs in October. This is the major opportunity for post-docs to present their work and hear thematically related seminars from NIH investigators.
- Office of Training and Education offers a number of courses in grant writing, interviewing. Take these classes if you are interested and it's an appropriate time in your career development.

3. Outside meetings

- Attendance at one outside meeting a year is typically supported and encouraged. There are myriad larger Society and smaller (Gordon Research Conference (summer), Cold Spring Harbor, Keystone) meetings. Think about what you want to learn, whom you want to meet, etc.
- You should receive pre-approval before registering for a meeting. We try to balance how many people from the lab attend the various meetings and who is going to submit what lab projects.
- A fellow can attend more than one meeting a year if for example s/he is presenting a talk, looking for a job.
- **You can present your own unpublished work, recognizing the balance between the benefit of interacting with colleagues and possible competition to publish. However, you are not allowed to present or discuss other lab members' unpublished data or even the experiments that are underway without specific permission from the lab member. Similarly, if you give me pictures or slides of your unpublished work, I will not present it without specifically discussing this with you.

4. Travel

Travel is one of the most regulated government endeavors. In fact it's so complicated, that it's not really worth trying to deal with yourself. Send PSS an email with the travel form filled out and include your preferred departure time and date, hotel, and return. If there is a meeting rate for hotels, there is some flexibility about you booking your own hotel room. Remember everything needs to be booked 15 days in advance for domestic, non-sponsored travel and 45 days in advance for any foreign or sponsored travel. Check with me before accepting a talk at a meeting if it is not one that the lab typically attends. While presenting a talk is an honor, oversee flights, hotels, etc may not be covered and result in large costs incurred to lab. Paying for registration of meetings has become very complicated and may require you to front the money and be reimbursed. I

5. Money and property.

- This is a highly regulated government endeavor.
- For most purchases, put it into POTS, or more specifically ask the lab manager to order through POTS.

- Do not pay for things personally and expect to be paid back. There is no 'petty cash' for me to reimburse you.
- You cannot take a computer or other device (projector) off campus without a property pass.

6. My work habits
    - My core hours at work are 10 AM to 6 PM.
    - Usually e-mail is the best way to reach me. I usually read and respond to emails in the morning before 8 AM and throughout the day.
    - If I have not responded to an email in 2 days, feel free to bug me. Sometimes I don't know the answer and need to find out.
    - I try to come into the lab every day to find out what is going on. You should also stop by my office.
    - If I'm travelling, I will try to tell people this in advance at lab meeting. I also tell lab manager and PSS when I'm on travel.
    - If I'm on vacation and do not plan to respond to e-mails, I will turn on my 'out of office' automatic response.
    - I am notoriously bad about checking cell phone messages or even answering my cell phone. But, I am really trying to be better. I will try to be more attentive to my cell phone when I am on work travel within US. Text or e-mail is more likely to get my attention.

7. My expectations of your work habits
    - Maintain core hours that are ~8 hours a day and overlap with the rest of the lab for at least 10 AM to 4 PM. I do understand that people value a flexible work schedule given the area commute. It will not always be possible to accommodate this when you are running an experiment with other lab members. For example, clinical labs starts really early in the morning (6 AM) and finish early (2 PM), so you cannot be trained in some techniques and expect to arrive at 10 AM.
    - Respond to emails, even just to give me an estimate of when you will have an answer for me, within 2 days.
    - I treat post-docs like other NIH employees in terms of time off: 2 weeks of vacation plus holidays. Let me know (email is fine) if you are planning a vacation. Sick leave (including doctor's visits that prevent you from working a full day or week) is up to 2 weeks and you should be prepared to provide a doctor's note (can go to OHR if personal) if you miss more than 3 days for an illness. Maternity/paternity basically follows FMLA (family medical leave act).
    - Turn on your out of office automatic response if you are sick/on vacation and do not plan to respond to e-mail .

8. Evaluation
- For trainees, there is a formal evaluation every June. The forms include feedback from both of us and your career goals. A copy can be given to you in advance. FTEs evaluations are performed in person at the end of the calendar year.
- Additional evaluation on a formal or informal basis can be performed if requested by either party on a quarterly basis.

9. Notebook, record keeping

- All molecular biology experiments should be stored in notebooks and data archived on a CD when submitted and finally published. All primary data for a manuscript should also be stored on the lab server.
- Electronic notebook policy and central place for storing these sorts of things is not yet standardized. The options are wiki on a stick (WoaS) or a self-modifying HTML/Javascript-based wiki. wikis are rich documents with the ability to include pictures, etc. Other issues that we are discussing are the storage of software versioning system (CVS) and detailed documentation of processing pipeline.
- Primary sequencing data are stored by institue. As well as storing secondary analysis, I prefer documentation of scripts to repeat the analysis if needed at a later date.

10. Authorship, publication

- If you are submitting an abstract for a meeting, please send it to me at least 2 days in advance for approval. If it's an abstract that you've submitted previously, please still let me know. Sometimes there are authorship or other considerations based on who else is attending the meeting and whether the meetings is closed or open to press.
- When you make a significant intellectual or experimental contribution to a project, then you will typically be an author on the manuscript.
- However, there have often been considerable resources devoted to a project before you ever receive the samples/data to analyze (e.g.; development of an IRB approved protocol, recruitment of patients). Even if others do not contribute a figure to a paper, they may also deserve authorship.
- Authorship (including order of authors) is always discussed before a manuscript is submitted from the lab.

11. Collaboration

- Do not send or give reagents to someone who asks you for them. Send them on to me. We may have received the reagent from another lab and not be allowed to share it. Or we may not be ably to freely distribute reagents (especially clinical samples) without paperwork and justification. Or the person requesting the reagent may be a direct competitor of an existing collaborator.
- If you initiate a new collaboration, copy me on initial email interaction. I ultimately assume responsibility for all transactions (mice, clones, clinical samples).
- If there is a misunderstanding or a conflict with a collaborator – talk to me. Remember that the lab may have multiple interactions with this lab or individuals that could be impacted. We might also have a history with this individual that helps to explain what you perceive to be an odd response.
- Do not alter the animal study protocol or human clinical protocol without giving me a lot of prior notice. I am responsible for animal and human welfare and only I can change these protocols. This is partially about my responsibility, authority and also that I may have written the section with very specific goals that might not be considered with your suggested change.

# NEI Sample Laboratory Compact

*This compact serves both as a pledge and a reminder to mentors and their trainees that their conduct in fulfilling their commitments to one another should reflect the highest professional standards and mutual respect.*

What you can expect from me, as mentor

- I will provide for every trainee under my supervision an environment that is intellectually stimulating, emotionally supportive, safe, and free of harassment.

- I am mindful that each trainee has traveled a unique path to our group and am committed to helping every member of our group succeed – no matter their background, personal strengths and weaknesses, or career goals. I will try my best to understand your unique situation and to provide a training environment that will foster your scientific and professional growth.

- I will encourage you to be creative, think critically, be appropriately skeptical, and develop other habits of the mind that will serve you well in research as well as other professional careers.

- I will facilitate your training as a scientist and researcher, which includes development of many complementary skills such as oral and written communication, grant writing, lab management, mentoring, and scientific professionalism.

- I recognize that it is important for you to take advantage of the full spectrum of training opportunities in the NIH IRP and encourage you to complement your lab work with appropriate professional development and scientific training outside the lab.

- I recognize that there are multiple career options available to trainees and will provide assistance in exploring appropriate options.

- I will afford you a degree of independence and responsibility commensurate with your previous experience and demonstrated abilities. This will evolve over time.

- I will evaluate your work thoroughly, carefully, and in a timely manner, holding you to an appropriately high standard. I will constructively criticize writing and presentation skills as part of professional development.

- I will criticize actions, not people.

- I will strive to maintain a relationship with all trainees that is based on trust and mutual respect. I acknowledge that open communication is key to establishing and maintaining such a relationship. I will be available for regular meetings and informal conversations. [Possibly define frequency of formal meetings. "Door always open" policy is good, but consider a signal for when you want to be undisturbed (barring emergency).]

- I will strive to make my expectations clear and to ensure that they are well-aligned with your expectations.

- At regular intervals I will sit down with you to discuss progress and goals. [Should be a formal, annual or semi-annual event. NIH will likely soon require that each fellow establish and maintain an Individual Development Plan (IDP), which will take care of this.]

- I will establish and communicate clear policies related to data management, publication and authorship, and use of laboratory resources.

- I will encourage you to interact with fellow scientists both intra- and extramurally and encourage you to attend professional meetings to network and present research findings.

- I am committed to helping you transition to the next stage of your career and recognize that the role of a mentor often continues well beyond the formal training period. I will provide honest letters of evaluation for you, and to the extent you wish, continue to be a supportive colleague as you advance in your career.

What I expect from you, as trainee

- [Consider including some basic statements concerning lab procedures and policy as relates, for example, to work hours, vacation policy, lab meeting attendance, travel.]

- You must take responsibility for your success. I will help you make your experience as consistent as possible with your goals and priorities.

- I expect you to be the driving force behind your project. I expect you to read, attend lectures, take notes in meetings, think deeply about your work, and interact with me as often as necessary.

- Seek out regular communication with me. Bring problems and issues to my attention before they grow large. I cannot help with problems I am unaware of.

- Work hard, and predictable hours (to the extent possible). I discourage "death from overwork," but at certain times (when conference or grant deadlines approach, or when a project's goals are not being met), I expect extra time (evenings, weekends). After a crunch, compensatory time off is not only acceptable but recommended.

- After a project meeting or a supervisory meeting, use your notes to write down your understanding of the decisions made at that meeting. By writing things down, you will clarify your own thoughts, ensure that your expectations are aligned with mine, and create a permanent record of your work.

- Maintain detailed, organized, and accurate laboratory records. Be aware that your lab notes, records and all tangible research data are the property of the lab director.

- Be open to advice and constructive criticism. The feedback you get from me, your colleagues, your committee members, and your course instructors is intended to improve your scientific work.

- Practice making clear scientific arguments during formal lab meetings and informal discussions. Critique data and ideas freely, honestly and constructively. But disagree without being disagreeable.

- Challenge yourself by presenting your work at meetings and seminars as early as you can and by preparing scientific articles that effectively present your work to others in the field.

- Treat your lab mates, lab funds, equipment, and subject (e.g., humans, animals, cells) with respect. Strive to be the very best lab citizen. Take part in shared laboratory responsibilities and use laboratory resources carefully and frugally.

- Be a good collaborator. Engage in collaborations within and beyond our lab group. Collaborations are more than just publishing papers together. They demand effective and frequent communication, mutual respect, trust, and shared goals. Effective collaboration is an extremely important component of the mission of our lab.

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# Compact Between Biomedical Graduate Students and Their Research Advisors

*A framework for aligning the graduate student mentor-mentee relationship*

January 2017

Association of
American Medical Colleges

The following members of the compact review team are gratefully acknowledged for their contributions to this update:
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The AAMC is a not-for-profit association representing all 147 accredited U.S. medical schools, nearly 400 major teaching hospitals and health systems, and more than 80 academic and scientific societies. Through these institutions and organizations, the AAMC represents nearly 160,000 faculty members, 83,000 medical students, 115,000 resident physicians, and thousands of graduate students and postdoctoral trainees in the biomedical sciences.

To download this document, go to www.aamc.org/gradcompact.

# Introduction

The *Compact Between Biomedical Graduate Students and Their Research Advisors* presents guiding principles intended to support the development of positive mentoring relationships between predoctoral students and their research advisors. A successful student-mentor relationship requires commitment from the student, mentor, graduate program, and institution. This document offers a set of broad guidelines that are meant to initiate discussions at the local and national levels about the student-mentor relationship.

There are several potential uses for this document. Among those suggested are the following:

- As a starting point for discussions between predoctoral students, research advisors, and institutional administrators about the issues addressed by the compact
- As part of the orientation for new predoctoral students
- As part of a regular and ongoing discussion between predoctoral students and their research advisors
- As a source of topics to be discussed in graduate research programs
- As a part of the orientation for new research faculty
- As a source of topics to be discussed in faculty mentorship programs
- As a component of faculty evaluations
- As a tool to initiate the development of additional programs and support services for predoctoral students within a graduate research program

This compact was originally drafted in 2008 in collaboration with representatives of the AAMC Group on Graduate Research, Education, and Training (GREAT Group) and is modeled on the AAMC's *Compact Between Postdoctoral Appointees and Their Mentors*, available at www.aamc.org/postdoccompact. Input on this document was received from GREAT Group representatives and members of the AAMC governance. The document was endorsed by the then AAMC Executive Council on September 25, 2008. In 2016, a team consisting of representatives from the GREAT Group and the AAMC Council of Faculty and Academic Societies (CFAS) reviewed and updated the document. The GREAT Group, CFAS, and AAMC staff leadership provided input on the revised draft.

# Compact Between Biomedical Graduate Students and Their Research Advisors

Predoctoral training entails both formal education in a specific discipline and research experience in which the graduate student trains under the supervision of one or more investigators who will mentor the student through graduate school. A positive mentoring relationship between the predoctoral student and the research advisor is a vital component of the student's preparation for future careers and mentoring roles.

Individuals who pursue a biomedical graduate degree are embarking on a path of lifelong learning and are therefore expected to take responsibility for their scientific and professional learning and development from the onset. Graduate students must be in charge and take ownership of their progress through the graduate program. This means seeking guidance on and knowledge about course requirements and program requirements, policies, and procedures. Students must also commit to working on an individual development plan. Faculty members who advise students—with the backing of the graduate program and institution—are expected to fulfill the role of mentor, which includes providing scientific training, guidance, instruction in the responsible conduct of research and research ethics, and financial support. The faculty advisor also serves as a scientific and professional role model for the graduate student. In addition, the advisor offers encouragement as the graduate student prepares an individual development plan and facilitates the experiences and professional skills development essential for a broad set of career paths.

# Core Tenets of Predoctoral Training

## Institutional Commitment

Institutions that train biomedical graduate students must be committed to establishing and maintaining rigorous graduate programs with the highest scientific and ethical standards. Institutions should work to ensure that students who complete their programs possess the foundational knowledge, skills, and values that will allow them to mature into scientific professionals of integrity. They should have oversight of the graduate curricula, length of study, stipend levels, benefits, career guidance, grievance procedures, and other matters relevant to the education of biomedical graduate students (e.g., consideration of, preparation for, and exposure to various career paths). Institutions should recognize and reward their graduate-training faculty. With changing and diversified biomedical workforce needs, institutions should recognize the necessity of faculty development around multiple career paths for trainees and provide opportunities for faculty to acquire such skills and experiences. Additionally, institutions should also foster an environment that is diverse and inclusive.

## Program Commitment

Graduate programs should establish training that prepares students with broad and deep scientific knowledge and the technical, professional, and leadership skills necessary for a successful career in the biomedical sciences. Programs should closely monitor the progress of graduate students during their course of study by establishing milestones and clear parameters for outcomes assessment, as well as maintain and make available career outcomes data.

## Quality Mentoring

Effective mentoring is crucial for graduate school trainees as they begin their scientific careers. Faculty mentors must commit to dedicating substantial time to the scientific, professional, and personal development of the graduate student. Whether a faculty member acts as the primary research advisor or sits on a student's advisory committee, a relationship of mutual trust and respect between mentor and graduate student is essential for healthy interactions and to encourage individual growth. Effective mentoring should include teaching the scientific method, providing regular feedback in the form of both positive support and constructive criticism to foster individual growth, teaching the "ways" of the scientific enterprise, and promoting careers by providing or directing students to appropriate opportunities. The best mentors are careful listeners who actively promote and appreciate diversity. They possess and consistently maintain high ethical standards, acknowledge and recognize the contributions of students—in publications and intellectual property, for example—and have a record of research accomplishments and financial support. Finally, it should be recognized that mentoring does not end with a student's completion of the graduate program but continues throughout the student's professional life.

## Skill Sets and Counseling for a Broad Range of Career Choices

The institution, training programs, and mentor should provide training relevant to a broad variety of careers that will allow graduate students to appreciate, navigate, discuss, and develop career choices. Effective and regular career guidance activities should be offered.

# Commitments of Graduate Students

- **I acknowledge that I have the primary responsibility for the successful completion of my degree.** I will be committed to my graduate education and will demonstrate this by my efforts in the classroom, the research laboratory, and all other related academic and professional activities. I will maintain a high level of professionalism, self-motivation, initiative, engagement, scientific curiosity, and ethical standards, including complying with institutional and research group standards for contributing to an inclusive research environment.

- **I will meet regularly with my research advisor to provide updates on the progress and results of my course work, research, and professional and career development activities.**

- **I will work with my research advisor to develop a thesis/dissertation project.** This will include establishing a timeline for each phase of my work. I will strive to keep engaged with the work, discuss experimental findings and any pitfalls, and meet the established goals and deadlines.

- **I will work with my research advisor to select a thesis/dissertation committee.** I will commit to meeting with this committee at least annually (or more frequently, according to program guidelines). I will discuss my progress to date and be responsive to the advice and constructive criticism from my committee.

- **I will be a good lab citizen.** I agree to take part in shared laboratory responsibilities and will use laboratory resources carefully and frugally. I will maintain a safe and clean laboratory space. I will be respectful of, tolerant of, and work collegially with all laboratory personnel. I will be an active contributing member to all team efforts and collaborations and will respect individual contributions. I will also contribute to an environment that is safe, equitable, and free of harassment.

- **I will maintain detailed, organized, and accurate research records. With respect to data ownership, I acknowledge that original notebooks, digital files, and tangible research materials belong to the institution and will remain in the lab when I finish my thesis/dissertation so that other individuals can reproduce and carry on related research, in accordance with institutional policy.** Only with the explicit approval from my research mentor and in accordance with institutional policy may I make copies of my notebooks and digital files and have access to tangible research materials that I helped to generate during my graduate training.

- **I will discuss policies on work hours, medical leave, and vacation with my graduate program and research advisor.** I will consult with my advisor in advance of any planned absences and apprise my advisor of any unexpected absences due to illness or other issues.

- **I will discuss policies on authorship and attendance at professional meetings with my research advisor.** I will work with my advisor to disseminate all relevant research results in a timely manner before completion of all degree requirements.

- **I will be knowledgeable of the policies and requirements of my graduate program, graduate school, and institution.** I will commit to meeting these requirements in the appropriate time frame and will abide by all institutional policies and procedures.

- **I will attend and actively participate in laboratory meetings, seminars, and journal clubs that are part of my educational program.** To enhance research, leadership, and additional professional skills, I will seek out other enrichment opportunities, such as participation in professional organizations and meetings, student representation on institutional committees, and coordination of departmental events.

- **I will be knowledgeable of all institutional research policies.** I will comply with all institutional laboratory safety practices and animal-use and human-research policies. I will participate in my institution's Responsible Conduct of Research Training Program and practice the guidelines presented therein while conducting my research. I will also seek input on and comply with institutional policies regarding my research design and data analysis.

- **I acknowledge that I have the primary responsibility for the development of my own career.** I recognize that I need to explore career opportunities and paths that match and develop my individual skills, values, and interests to achieve my desired career goals. I understand that there are tools such as the individual development plan that I should use to help me define my career goals and develop my training plan. I will seek guidance throughout my graduate education from my research advisor, career counseling services, thesis/dissertation committee, other mentors, and any other resources that can offer advice on career planning and the wide range of opportunities available in the biomedical workforce.

# Commitments of Research Advisors

- **Throughout the graduate student's time in my laboratory, I will be supportive, equitable, accessible, encouraging, and respectful.** I will foster the graduate student's professional confidence and encourage intellectual development, critical thinking, curiosity, and creativity. I will continue my interest and involvement as the student moves forward into a career.

- **I will be committed to meeting one-on-one with the student on a regular basis. I will regularly review the student's progress and provide timely feedback and goal-setting advice.**

- **I will be committed to the graduate student's research project.** I will work with the student to help plan and guide the research project, set reasonable and attainable goals, and establish a timeline for completion of the project.

- **I will help the graduate student select a thesis/dissertation committee.** I will assure that this committee meets at least annually (or more frequently, according to program guidelines) to review and discuss the graduate student's progress and future directions. I understand that the function of this committee is to help the student complete the doctoral research, and I will respect the ideas and suggestions of my colleagues on the committee.

- **I will provide an environment that is intellectually stimulating, emotionally supportive, safe, equitable, and free of harassment.**

- **I will demonstrate respect for all graduate students as individuals without regard to gender, race, national origin, religion, disability or sexual orientation, and I will cultivate a culture of tolerance among the entire laboratory.**

- **I will be committed to providing financial resources, as appropriate and according to my institution's guidelines, for the graduate student to conduct thesis/dissertation research.** I will not require the graduate student to perform tasks that are unrelated to the training program and professional development.

- **I will expect the graduate student to share common laboratory responsibilities and use resources carefully and frugally.** I will also regularly meet with the graduate student to review data management, storage, and record keeping. I will discuss with the student intellectual policy issues regarding disclosure, patent rights, and publishing research discoveries.

- **I will discuss with the graduate student authorship policies regarding papers.** I will acknowledge the graduate student's scientific contributions to the work in my laboratory, and I will provide assistance in getting the student's work published in a timely manner.

- **I will be knowledgeable of and guide the graduate student through the requirements and deadlines of the graduate program and the institution, as well as teaching requirements, if any, and human resources guidelines.**

- **I will encourage the graduate student to attend and present their research at scientific/professional meetings and make an effort to secure and facilitate funding for such activities. In addition, I will provide opportunities for the student to discuss science and their research findings with colleagues and fellow scientists within the institution and broader scientific community—for example, at lab meetings, research days, and seminars.**

- **I will promote the training of the graduate student in professional skills needed for a successful career. These skills include but are not limited to oral and written communication, grant writing, management and leadership, collaborative research, responsible conduct of research, teaching, and mentoring.** I will encourage the student to seek opportunities to develop skills in other areas, even if not specifically required by the student's program. I will also encourage the graduate student to seek input from multiple mentors.

- **I will create an environment in which the student can discuss and explore career opportunities and paths that match their skills, values, and interests and be supportive of their career path choices.** I will be accessible to give advice and feedback on career goals. I will work with the student on an individual development plan to help define career goals and identify training milestones. I will provide letters of recommendation for the student's next phase of professional development.


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# Compact Between Postdoctoral Appointees and Their Mentors

*A framework for aligning the postdoctoral appointee mentor-mentee relationship*

January 2017

Association of
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The following members of the compact review team are gratefully acknowledged for their contributions to this update:
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To download this document, go to www.aamc.org/postdoccompact.

# Introduction

The *Compact Between Postdoctoral Appointees and Their Mentors* presents guiding principles intended to support the development of positive mentoring relationships between postdoctoral appointees and their mentors. A successful mentee-mentor relationship requires commitment from the postdoctoral appointee, mentor, and institution. This document offers a set of broad guidelines that are meant to initiate discussions at the local and national levels about the mentee-mentor relationship.

There are several potential uses for this document. Among those suggested are the following:

- As a starting point for discussions between postdoctoral program directors, administrators, faculty, postdoctoral appointees, and other institutional leaders about the issues addressed by the compact
- As a recruitment tool to signify programmatic commitment to postdoctoral appointees
- As an attachment to offer letters from mentors to postdoctoral appointees
- As part of a contract that could be signed by the postdoctoral appointees and their mentors
- As part of the orientation for new postdoctoral appointees
- As part of the orientation for new faculty
- As a component of the appointee-mentor annual evaluation process
- As a source of topics to be discussed in faculty mentorship programs
- As a component of faculty evaluations
- As part of an educational database for faculty promotion

This compact was originally drafted in 2006 in collaboration with representative of the AAMC Group on Graduate, Research, Education, and Training (GREAT Group) and its then postdoctorate committee. It is modeled on the AAMC's *Compact Between Resident Physicians and Their Teachers*, available at www.aamc.org/residentcompact, and was used as a model for the AAMC's *Compact Between Biomedical Graduate Students and Their Research Advisors*, available at www.aamc.org/gradcompact. Input on the document was received from GREAT Group representatives, members of the AAMC governance, and other members of the postdoctoral community, including the National Postdoctoral Association. At its annual business meeting in October 2006, the GREAT Group unanimously endorsed the document. The document was subsequently endorsed by the then AAMC Executive Committee on October 20, 2006. In 2016, a team consisting of representatives from the GREAT Group and the AAMC Council of Faculty and Academic Societies (CFAS) reviewed and updated the document. The GREAT Group, CFAS, and AAMC staff leadership provided input on the revised draft.

# Compact Between Postdoctoral Appointees and Their Mentors

Postdoctoral appointees typically join an institution to advance their training in a chosen discipline after recently obtaining their terminal degree (e.g., PhD, MD, DVM). This training, which should be for a defined period of time, is conducted under the supervision of one or more investigators who are qualified to fulfill the responsibilities of a mentor. In addition to the primary responsibility of conducting research, the postdoctoral appointee may also undertake leadership, service, and teaching activities that together provide a training experience essential for professional development and career advancement.

# Core Tenets of Postdoctoral Training

## Institutional Commitment

Institutions that train postdoctoral appointees must be committed to maintaining the highest standards for scientific and professional training and for a program that, when completed, has prepared the trainee with the skills necessary to function independently as a scientific professional. Institutional oversight must be provided for terms of appointment, salary, benefits, grievance procedures, and other matters relevant to the support of postdoctoral appointees. A responsible institutional official must be designated to provide this oversight, and a suitable office should be available for the administrative support of postdoctoral affairs, including maintaining and making available career outcomes data. The institution should actively engage in creating and sustaining a diverse and inclusive environment.

## Quality Postdoctoral Training

Individuals should be trained to formulate meaningful hypotheses, design and conduct interpretable experiments, adhere to good laboratory practices, analyze results critically, understand the broad significance of their research findings, and uphold the highest ethical standards in research. The development of additional skills—including oral and written communication, grantsmanship, peer review, teaching, mentoring, laboratory management, and other leadership skills—is considered integral to this training.

## Importance of Mentoring in Postdoctoral Training

Effective mentoring is critical for postdoctoral training. In addition to the research mentor, postdoctoral appointees are encouraged to seek advice and input from multiple individuals who can provide feedback about personal and professional development. It is expected that the primary research mentor will dedicate time to the trainee's career development. A good mentor-mentee relationship is reciprocal and characterized by mutual respect and an understanding of each individual's expectations. A mentor should be approachable, available, and willing to share knowledge; listen and communicate effectively; provide encouragement and constructive criticism; and offer expertise and guidance. Similarly, the mentee should be approachable, available, and willing to offer ideas and solutions; listen and communicate effectively; be open to constructive criticism; and seek and respond to expert guidance.

## Foster Breadth and Flexibility in Career Choices

Postdoctoral appointees must have opportunities to learn about and develop a skill set that can be used in a wide range of professional careers. The responsibility for providing these opportunities should be shared by the mentor and the institution. It is important to note that postdoctoral positions are intended for those seeking advanced research training and should not be viewed by graduate students, postdoctoral appointees, or their mentors as the default step after the completion of doctoral training.

# Commitments of Postdoctoral Appointees

- **I acknowledge that I have the primary responsibility for the development of my own career.** I recognize that I need to explore career opportunities and follow a path that matches my individual skills, values, and interests. I understand that there are tools such as the individual development plan that I should use to help me define my career goals and develop my training plan.

- **I will develop with my mentor a mutually agreed upon research plan that includes well-defined goals and timelines.** Ideally, this plan should be developed early in the appointment period and reviewed at least annually.

- **I will seek regular feedback on my performance and career planning and ask for a formal evaluation at least annually.** I will use this feedback to seek opportunities for development and to build on my strengths.

- **I will perform my research activities conscientiously, maintain complete and accurate research records, and catalog and maintain all tangible research materials that result from the research project.**

- **I will respect all ethical standards—including compliance with all institutional, state, and federal regulations—as they relate to responsible conduct in research, possible conflicts of interest, privacy and human subjects research, animal care and use, laboratory safety, authorship, peer-review guidelines, and data ownership, reporting, and sharing.** I recognize that this commitment includes asking for guidance when presented with ethical or compliance uncertainties and reporting on breaches of ethical or compliance standards by me and/or others.

- **I will show respect for and will work collegially with mentors, faculty, trainees, staff, and other individuals with whom I interact. I will contribute to an environment that is safe, equitable, and free of harassment.** I will be an active, contributing member to all team efforts and collaborations and will respect individual contributions. I am also committed to communicating the value of biomedical research to advancing the public good.

- **I will endeavor to assume progressive responsibility and management of my research project(s) as it matures.** I recognize that assuming responsibility for the conduct of research projects is critical to my career path.

- **I will have open and timely discussions with my mentor concerning the dissemination of research findings and the distribution of research materials to third parties. I will also work with my mentor to disseminate research results in a timely manner.**

- **With respect to data ownership, I acknowledge that original notebooks, digital files, and tangible research materials belong to the institution and will remain in the lab when I finish my appointment, in accordance with institutional policy.** Only with the explicit approval from my research mentor and in accordance with institutional policy may I make copies of my notebooks and digital files and have access to tangible research materials that I helped to generate during my postdoctoral appointment. I will discuss data ownership with my mentor and reach mutual agreements on future access to tangible research materials and ideas.

- **I recognize that I have embarked on a career requiring lifelong learning.** To meet this obligation I must stay abreast of the latest developments in science, especially in my specialized field. I will do this by engaging in activities such as reading the literature, participating regularly at relevant seminar series, attending scientific meetings, and interacting with leaders in my field and collaborators. In addition, I will apply for appropriate fellowships and awards that support my transition to independence.

- **I will actively seek opportunities outside the laboratory (e.g., professional development seminars and workshops on oral communication, scientific writing, collaborative research, and teaching) to develop the full set of professional skills necessary for success in my chosen career.**

- **I recognize that the relationship with my mentor continues after my formal training period, and I will commit to being a supportive colleague throughout my professional life.**

# Commitments of Mentors

- **I acknowledge that the postdoctoral period is devoted to advanced training intended for the development of skills needed to promote the career of the postdoctoral appointee.** I will ensure that the postdoctoral appointee has sufficient opportunities to acquire the skills necessary to become an expert in an area of research investigation. I will work with the postdoctoral appointee as the appointee creates a documented individual career development plan, which I will use as the basis for periodic discussions. I will respect the appointee's individual career goals.

- **I will ensure that a mutually agreed upon research plan with well-defined expectations and goals is established early in the postdoctoral training period.** I will review the plan's progress regularly.

- **I will provide regular feedback on performance and career planning and provide a formal evaluation at least annually.** I will be accessible to give advice and feedback on career planning and the postdoctoral appointee's individual development plan to help define career goals and identify training milestones.

- **I will strive to maintain a relationship with the postdoctoral appointee that is based on trust and mutual respect.** I will provide an environment that is intellectually stimulating, emotionally supportive, safe, equitable, and free of harassment. I acknowledge that open communication is essential.

- **I will demonstrate respect for all postdoctoral appointees as individuals without regard to gender, race, national origin, religion, disability, or sexual orientation, and I will cultivate a culture of tolerance among the entire laboratory.**

- **I will promote all ethical standards for conducting research—including compliance with all institutional, state, and federal regulations—as they relate to responsible conduct in research, privacy and human subjects research, animal care and use, laboratory safety, authorship, peer-review guidelines, and data reporting, ownership, and sharing.** I will clearly define expectations for the responsible conduct of research in my lab and make myself available to discuss ethical, safety, and any related concerns as they arise.

- **I will provide the appointee with guidance and mentoring and will seek the assistance of other faculty and departmental/institutional resources when necessary. I will also encourage the postdoctoral appointee to seek input from multiple mentors.** I recognize that I must serve as a role model for the postdoctoral appointee and provide access to formal opportunities/programs in complementary areas necessary for a successful career.

- **I will provide a supportive training environment to facilitate the postdoctoral appointee's personal and professional growth.** I will encourage the postdoctoral appointee to progressively increase levels of responsibility and independence to ensure a successful transition to an independent career.

- **I will ensure that the research performed by the postdoctoral appointee is submitted for publication in a timely manner and that appropriate credit is given to the appointee for work done. I will acknowledge the appointee's contribution to the development of any intellectual property.**

- **I will clearly define future access to tangible research materials according to institutional policy and will discuss this with the trainee and reach mutual agreements that support the trainee's transition to independence.**

- **To foster career development, I will encourage and assist the postdoctoral appointee to apply for appropriate fellowships and awards that support the transition to independence. I will encourage and facilitate the interaction of the postdoctoral appointee with fellow scientists both intra- and extramurally, including the appointee's attendance at professional meetings to network and present research findings.**

- **I recognize that there are multiple career options available for postdoctoral appointees and will provide assistance in exploring appropriate options.** I recognize that not all postdoctoral appointees will become academic faculty. To prepare postdoctoral appointees for a variety of career paths, I will direct them to the resources that will allow for exploration of various careers, and I will be available to discuss these options.

- **I will commit to being a supportive colleague to postdoctoral appointees as they transition to the next stage of their careers and, to the extent possible, throughout their professional lives.** I recognize that the role of a mentor continues after the formal training period.


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