



Medical Scientist Training Program

Handbook
2009-2010

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I. Mission

The Medical Scientist Training Program (MSTP) is an MD/PhD program at the University of Virginia that prepares students for careers in academic medicine.

Our goal is to train individuals who will be outstanding physicians and scientists and who will be pioneers in medical practice and research.

Our program aims to provide students with the skills, knowledge, and expertise to conduct the highest quality of research, and to instill both a passion for biomedical research and a desire to integrate this with medical practice, qualities which will sustain them for a lifetime.

II. History

The University of Virginia undertook dramatic expansion of research and training programs in the basic biomedical sciences during the late 1960s and early 1970s. All chairmen of the basic science departments of the School of Medicine were newly appointed during this time, a major new research building was constructed, and individual departments grew several-fold in size and quality. Similar but less dramatic growth followed in the clinical departments. Interest in the training of medical scientists flourished rapidly in this environment, in part because many of the new faculty either had experience with MSTPs or were recent graduates of such programs. Accordingly, an MSTP committee was appointed in 1971 under the leadership of Dr. Robert C. Haynes, Jr., and funds were provided by the University to initiate such training. An application for training funds was submitted to the National Institute of General Medical Sciences (NIGMS) in 1972, just prior to the time when the appropriation for such training programs was withdrawn. The application was resubmitted in 1975, and NIH support was first received in 1977 under the future Nobel Laureate, Dr. Alfred G. Gilman.

Previous Directors

Name of Director	Tenure as Director
Dr. Robert C. Haynes, Jr.	1971-1978
Dr. Alfred G. Gilman, MD, PhD	1978-1981
Dr. Thomas E. Thompson, PhD	1981-1984
Dr. Rodney L. Biltonen, PhD	1984-1993
Dr. Steven Gonias, MD, PhD	1993-1998
Dr. Gary K. Owens, PhD	1998-present

III. Structure of the Program

(see also Appendix A – Organizational Chart)

UVA MSTP Administration

Name	Position in MSTP	Academic Position	Contact Information
Gary K. Owens, Ph.D.	Director	Professor of Molecular Physiology & Biological Physics	gko@virginia.edu ; MR5 # 1322; 924-2652
Dean H. Kedes, M.D., Ph.D.	Associate Director for Admissions & Recruiting	Associate Professor of Internal Medicine, Infectious Diseases	kedes@virginia.edu ; Jordan # 7072; 243-2758
Dennis J. Templeton, M.D., Ph.D.	Associate Director for Curriculum	Walter Reed Professor & Chair, Department of Pathology	templeton@virginia.edu ; MR5 # 3073A; 924-1946
Anindya Dutta, M.D., Ph.D.	Associate Director for Scientific Programs	Byrd Professor of Biochemistry and Molecular Genetics	ad8q@virginia.edu Jordan Hall Extension 1240 924-1227
Anne W. Dickey	Assistant Director		awd6v@virginia.edu ; mstp@virginia.edu Jordan # 1102; 924-1294

An administrative structure is in place to give the Program greater control and involvement in setting the standards and requirements for both the M.D. and Ph.D. degrees.

Day-to-day administrative duties are carried out by Dr. Owens and the MSTP Assistant Director. These duties include all student matters: course registration, selecting and scheduling reading courses and lab rotations, facilitating co-mentoring relationships, student financing, collection of annual progress reports, facilitating student clinical training activities, assisting students in selecting and setting up lab rotations, and schedules MSTP activities.

The MSTP Assistant Director maintains student records and provides administrative support to the MSTP Director and Associate Directors. The Assistant Director also assists the student committees with organizing their planned activities.

The MSTP Assistant Director's office is located in the Graduate Programs Office, Jordan Hall 1102. The Graduate Programs Office staff assists MSTP students in the Assistant Director's absence and supports various MSTP services.

Three Associate Directors assist the program. The Associate Directors are appointed by Dr. Owens and the Dean of the School of Medicine.

Admissions and Recruiting – The Associate Director for Admissions and Recruiting, Dr. Dean Kedes, co-chairs the MSTP Admissions Committee with the Director. Along with Dr. Owens, he reviews and evaluates complete applications. The Associate Director and Director also interview all MSTP candidates invited for an interview. Dr. Owens and/or Dr. Kedes attend the Medical Admissions Committee when MSTP candidates are being considered.

Curriculum – The Associate Director for Curriculum, Dr. Dennis Templeton, co-chairs the MSTP Curriculum Committee with the Director. Both the Director and Associate Director sit on the Medical Education Curriculum Committee. In this capacity, the Associate Director coordinates and reduces the overlap that occurs during the first year of Medical School with the Graduate School courses. This Associate Director also heads the MSTP's Transition Committee which supports students completing their Ph.D. as they enter clinical clerkships and as they make future residency plans.

Scientific Programs – Associate Director for Scientific Programs, Dr. Anindya Dutta, co-chairs the MSTP Scientific Programs Committee with the Director and assists the Director in developing programmatic activities to promote interaction and scientific exchange between the MSTP students and to foster their development as physician scientists. These activities include participation in monthly Research in Progress Dinners, the student-run Molecular Medicine Lecture Series, and the annual retreat. In addition, the Associate Director for Scientific Programs and the Director share the responsibility to chair the MSTP's Physician-Scientist Advisory Committee (PSAC) Meetings, drawing from a brief progress report form (see Appendix C) and discussing the student's progress, future milestones, integration of M.D. and Ph.D. training, and future clinical training plans. See Section V for more details on the Committee. Mentors, (including MSTP Directors who have MSTP students), do not sit on PSAC Meetings for their own students.

IV. Financial Support of MSTP Students

The MSTP fiscal year runs July 1 through June 30 of the following year, so it is important to note that *your funding may change in some respect every July 1*. You can expect to hear from various administrative people in May and June to ensure that your funding is in place; if you have any concerns about upcoming funding shifts, please do not hesitate to contact your BIMS Administrator (if you are in the PhD portion) or the MSTP Assistant Director.

Each fiscal year students in good standing are awarded full scholarships that cover their stipend, tuition & fees, health insurance and a modest travel allowance. The financial package is guaranteed by the MSTP and The University of Virginia as long as a student is in good standing. However, the "expected" source of funding varies depending on your year in the program as outlined below.

During the medical school years (Med 1, Med 2, Med 3, and Med 4) and the first year of Graduate School (Grad 1), the MSTP funds the students through the MSTP Training Grant or other institutional funds at its disposal.

During the rest of the students' Graduate School training, Ph.D. Mentors are responsible for full financial support of students. Sources of funding during this period include mentors' research grants, support from Institutional NIH training grants, departmental or center funds, and/or individual extramural fellowships obtained by students with their mentor's assistance. (Individual extramural funding results in \$1000 bonus pay for the student; see below.) Assuming a student is in good standing, the MSTP and Institution will provide backup support during this time period should the student's Ph.D. mentor or department/center be unable to fully fund a student.

The following are the items included in the students' benefit packages:

Stipend – The current base stipend is \$25,000 for fiscal year 2009-2010. In the past the University has provided cost of living adjustments per year, but the adjustment is not guaranteed each year.

Student stipends may be higher than \$25,000 based on numerous factors. If you receive an individual extramural fellowship such as an American Heart Association (AHA), Department of Defense (DOD), or National Research Service Award (NRSA) among others, you can request a merit increase to your student stipend; if you receive one of these awards, please contact your Biomedical Sciences (BIMS) administrator (who oversees your graduate program) to ensure that your merit pay is added to your stipend appropriately. The process of requesting the merit increase is to write to your BIMS Administrator, your BIMS director, and your mentor together to request the merit raise; the director and mentor must agree and then it must be approved by the Associate Dean of Graduate Education. Once a decision is made, the BIMS Administrator sends information to the funding coordinator in the Graduate Programs Office to set it up, and MSTP is notified.

Tuition and Fees—As appropriate for your year and the school in which you are enrolled.

Health and Dental Insurance – The current Graduate Programs policy is to provide a subsidy for the student coverage. The student can pay an additional amount for family coverage.

For 2009-2010 the rates are:

The Health Insurance subsidy is \$2092.00 for Chickering, a division of Aetna.

The Dental Insurance subsidy is \$321.00.

Students can enroll in the UVA Health Insurance Program through Chickering and the UVA Dental Insurance Program through United Concordia, both divisions of Aetna. If you receive the student health insurance through Chickering, your insurance will be paid directly to Chickering and you will complete the online health insurance sign-up in late early August. If you select another program, you can be reimbursed up to the above

listed subsidies per fiscal year. The dental insurance reimbursement is optional and is paid to the student for premiums paid by them for dental insurance.

Please refer to <http://www.virginia.edu/studenthealth/insurance.html> for more information.

Travel Support Guidelines – The MSTP encourages students to attend scientific conferences and meetings and grants *up to* \$500 per year to students, depending upon availability of funds. Regardless of year in program, each student is eligible for a travel allowance from the MSTP each fiscal year. The travel allowance can be combined with additional funds the student receives from other sources (e.g. travel awards from the scientific meeting, Mentor funds, etc.).

To receive the \$250 travel allowance, depending upon availability of funds:

1. The student must be in good standing with the Program.
2. Receive permission from the Director to use the MSTP travel allowance.
3. In Years 4 (Grad 2) and up, the student must be presenting material in an official format at the conference. In Years 1-3 (Med 1, Med 2 and Grad 1), you may have \$250 for attending a conference without presenting.
4. The student must have no more than two unexcused absences from monthly RIPS and Annual Retreat in the 12 months preceding the scheduled trip.

To receive the \$500 travel allowance, depending upon availability of funds:

1. The student must be in good standing with the Program.
2. Receive permission from the Director to use the MSTP travel allowance.
3. In Years 4 (Grad 2) and up, the student must be presenting material in an official format at the conference. In Years 1-3 (Med 1, Med 2 and Grad 1), you may have \$250 for attending a conference without presenting.
4. The student must have perfect attendance at monthly RIPS and the Annual Retreat within the 12 months preceding the scheduled trip.

Excused absences for all required MSTP activities will be granted for professional/academic (e.g. clerkship responsibilities, exam preparation, fulfillment of clinical preceptorship requirements, etc.), or unavoidable medical reasons only and not for personal conflicts. If you believe you have an excused conflict, you must contact the Director or Assistant Director in advance of the event to be granted an excuse. Note that this applies to students on clerkships. Clerkship students are expected to continue to attend required MSTP activities when possible and must ask for an excuse in advance when they cannot. Failure to attend required MSTP activities on a regular basis may result in expulsion from the program and forfeiture of your MSTP financial support package and scholarship. Students having 5 or greater unexcused absences in a given year will automatically be reviewed by the MSTP Executive Committee to determine if they should be allowed to continue in the program.

Students in Med 3 or 4 rarely use their travel money. Also, because these students are frequently on wards, having an accurate assessment of their deserved travel money can be complicated. As a matter of course, if you are in Med 3 or 4, you

should still write in to tell the Assistant Director each month with what your attendance will be at RIP, and you should still sign in at RIP if you are able to attend. If you intend to use travel money for a conference during Med 3 or 4, these requests will be handled on a case by case basis; please write the Assistant Director.

Graduate School Application Fees – When students transition from Med 2 to PhD, the MSTP will pay directly or reimburse students for any application fees. If you are applying to GSAS (Graduate School of Arts and Sciences), you should be able to get a fee waiver code for entry into the application system – ask the MSTP Assistant Director for it. If you are applying to SEAS (School of Engineering and Applied Sciences), you may need to pay and then be reimbursed.

Items not covered – Students are expected to pay for books, vaccinations, thesis binding, testing fees, and instruments from their stipend.

V. Physician-Scientist Advisory Committees

(see also Appendix B – Physician-Scientist Advisory Committee)

The functions of the MSTP Physician-Scientist Advisory Committees are not meant to duplicate or interfere with the primary guidance provided by the Ph.D. dissertation mentor, the student's dissertation committee, or the degree granting department or program responsible for each student. Instead, the MSTP PSAC is meant to augment those activities, to ensure that the student makes the progress they wish to make and satisfies the expectations of the MSTP. If substantial problems are identified through individual student advisory committees, the Director and Associate Director for Scientific Programs will advise the student on action to take and as appropriate will work themselves to resolve the concern.

Med 1 and Med 2 students are advised by the MSTP Associate Directors, in one on one meetings, at monthly group lunches, and in their committee meetings, who assist students in selecting courses and picking faculty mentors for reading courses and rotations. In addition, during the first year of the program, the committee works with students to establish their own personal Physician-Scientist Advisory Committee.

The Physician-Scientist Advisory Committee consists of at least three faculty members along with the Director and one of the Associate Directors: a physician-scientist, a MSTP faculty member who serves on the graduate committee of the program where the student pursues their Ph.D., and a MSTP mentor.

Physician-Scientist Advisory Committees are formed by the incoming students during the first year and remain in place throughout the entire duration of training, although the relative role played by each advisor varies depending on the stage of training of the student. Students frequently meet with individual advisors rather than the entire committee as often as is needed. There is one formal Student Advisory Committee meeting each Spring as part of the student's annual review process. As part of this review process, students are required to fill out annual progress report form (see

Appendix). The MSTP Assistant Director will send the annual progress report form to the MSTP students in after the semester break, which will be due on February 1. The Assistant Director will set up the Physician-Scientist Advisory Committee meeting slots during March, April, and May with two of the Directors, and students will contact committee members to select appropriate times and communicate with the Assistant Director to settle on a time.

The following are appropriate members of the Physician-Scientist Advisory Committee, but other members are welcome in the Committee.

Physician-Scientist – The physician scientist practices in a clinical specialty where the student has identified an interest. This individual plays an important role in advising the student regarding choice of specialty areas, career advising, and setting up limited clinical activities to enhance the student's understanding of biomedical and translational research. Along with the Transition Committee, the Physician-Scientist representative assists the student in preparing for the return to Medical School after completing the Ph.D. training.

Biomedical Sciences (BIMS) Graduate Program Representative – A second member of the student's Physician-Scientist Advisory Committee is a faculty member who represents the BIMS Graduate Program and the Ph.D. granting Program or Department that the student enters. Their role is to assist in advising the student regarding courses, lab rotations, selection of a mentor, and other programmatic requirements of the BIMS and Degree Program and ensuring that these are compatible with the interests of the MSTP. Although conflicts are not anticipated, this individual will help resolve any disputes that might arise.

Ph.D. Thesis Committee Representative – A third member of the Physician-Scientist Advisory Committee is an approved MSTP Faculty Mentor who is also a member of the student's Ph.D. Dissertation Committee. This individual is chosen based on their research expertise, and personal qualifications for serving on the student's thesis committee and are typically selected jointly by the student and their Ph.D. mentor. The MSTP requires at least one approved MSTP mentor (in addition to the student's primary mentor) to serve on the student's dissertation committee.

VI. Activities

There are several MSTP activities to supplement the training provided by degree granting graduate programs and the Medical School. MSTP activities are extremely important in promoting the unique development of physician scientists and to allow them to identify with a cohort group with similar goals and expectations.

"Research in Progress (RIP)" Meetings – The goals of the RIP dinner series is to promote scientific interactions between the students and to provide a forum for issues particular to physician scientists. The venue includes a mixture of formal student presentations, roundtable discussions, and brief informal research presentations by students followed by a lively discussion of the project and of its significance, alternative approaches, etc.

The RIP meetings run from 5:15 to 7:15pm every third Wednesday of the month except when the Molecular Medicine Lecture Series conflicts. Dinner is served at the RIP. Attendance is required unless students have an unavoidable prior professional/academic commitment and are excused in advance by the MSTP Director.

Several MSTP Mentors are invited to each RIP in addition to the Directors. Mentors who attend are introduced and give a 3-4 minute summary of their research programs at the beginning of the session. This serves to familiarize students with some of the mentors in the Program and often leads to students seeking out those individuals to explore readings courses, rotations, collaborations, assistance with a technique, etc.

During the year there are specific presentations, usually scheduled the following months:

(see also Appendix D – RIP guidelines)

September – Summer Rotation Presentations

1st or 2nd Year students who have just completed rotations give brief informal presentations regarding the rotation they completed over the summer. The presentations are typically 10 to 15 minutes in length.

February – Clinical Case Presentations

Senior students who are currently completing clerkships present a clinical case similar to how they present at Morning Reports.

June – Methods Roundtable

At the Methods Roundtable, a faculty member gives a talk about a research method in which students have expressed an interest.

July - “The Hot Seat”

The premise of these sessions is to have students selected by the Director or one of the Associate Directors give a 5-6 minute summary of their research project without slides indicating why their project is important, what has been done so far, what needs to be done, where the project is going long term, and problems or limitations in their project. Other students then ask brief questions to clarify their understanding of the project, and as needed, a faculty panel quizzes the audience on the project.

Molecular Medicine Lecture Series – MSTP students run this seminar series. There are up to four seminars over the course of a year. The MSTP Student Science Advisory Committee selects and invites the seminar speakers. One of the seminars per year is the Annual MSTP Distinguished Lecture. Attendance is required unless students have some unavoidable prior professional/academic commitment or for unavoidable medical reasons and are excused in advance by the MSTP Director.

Student Panel Discussions – These panel discussions happen intermittently depending on the level of interest. Topics commonly discussed are the transition from Medical School

to Graduate School; how to select a mentor; how to select a BIMS/ Ph.D. Program; and the transition of returning to Medical School after completing Ph.D. A no-faculty roundtable called "Tell It Like It Is" discusses graduate school challenges, and a Predoctoral Fellowships Workshop provides faculty support to students as they identify and develop their proposals for competitive predoctoral fellowships. These Roundtables are organized by the Scientific Committee, and attendance is expected.

Annual Retreat – The retreat happens the 1st weekend in August each year at a site selected by the MSTP Student Retreat Planning Committee. Attendance is required unless students have some unavoidable prior professional/academic commitment or unavoidable medical reason and are excused in advance by the MSTP Director.

Retreat formats vary between a weekend format and a day format. The weekend format includes a Friday evening RIP presentation by a current senior student and poster session where current students who are currently in Grad 2 through the completion of their Ph.D. present a poster regarding their research. Saturday night there is a round table discussion on a topic chosen by the MSTP Student Scientific Committee. The rest of the time is spent socializing and doing group activities available at the site. The day format involves 9-10 scientific presentations by students at an on-site location, breakfast and lunch, social time, and the Saturday night round table and dinner with faculty, and parties on Friday and Saturday nights.

The retreat is typically attended by over 80% of students (as this a requirement of the program) including the incoming first year students, as well as by Dr. Owens (Director), the Program Assistant Director and several invited physician scientists who participate in the Saturday night round table session. The faculty members are invited to bring their families and participate in the activities through out the weekend or day events.

1st Year Orientation – This orientation is typically held the Thursday prior to retreat and Medical School Orientation. It complements the week-long orientation process provided by the Medical School, reviews the 1st Year MSTP integrated curriculum, lays out program expectations, and addresses any questions students might have. In addition, the 2nd Year MSTP students attend and provide advice and guidance to 1st Year students and offer their assistance if needed. Finally, each of the first semester course directors attends and gives a brief overview of their course. Attendance is required.

Monthly Luncheons with the Director (First and Second Year Students Only) – Dr. Owens and an invited faculty guest (when appropriate) will have a monthly informal group lunch with first and second year MSTP students to discuss upcoming deadlines and any issues that have arisen for students. It is a great opportunity to voice concerns and give feedback to the Director on any programmatic or curricular issue. In addition, the invited faculty guest will be selected based on their expertise in an area of key importance to your professional development as a physician scientist. Attendance is required unless students have some unavoidable prior professional/academic commitment or for unavoidable medical reasons, excused in advance by the MSTP Director.

Other MSTP Activities – There are additional MSTP group activities each year that are completely social in nature including a welcoming picnic held in September/ October that gives the new class an opportunity to meet the rest of the MSTP students in an informal setting. The MSTP Social Chair organizes monthly events either after RIP or on weekends.

Other SOM Activities – MSTP students also participate in many other School of Medicine activities that foster their development as scientists. This includes the Annual Medical Student Research Day and the Annual Graduate Biosciences Student Symposium.

VII. Student Committees

Name of Committee	Chair and Contact Information
Admissions	Anne-Laure Talbot (allary@virginia.edu)
Newsletter	Lynn Hassman (lynnhassman@virginia.edu)
Research In Progress	Carrie Hall (ch4pm@virginia.edu) Josh Meisner (jmeisner@virginia.edu)
Retreat	Karen Wheeler (kmw8g@virginia.edu)
Scientific Programs	Jeff Sturek (sturek@virginia.edu)
Social	Liz Thompson (edthom@virginia.edu)

Students are encouraged to participate in the student committees. All of the committees are assisted by the Program.

Admissions & Recruiting – Anne-Laure Talbot leads this committee. Admissions & Recruiting assists with the coordination of recruiting activities such as student meals with applicants and student involvement in the Second Look Weekend activities. This committee assists applicants and admitted students in getting current students' perspectives on the Program. Admissions & Recruiting Committee members interview each applicant who attends interview weekends at UVA and submit evaluations of the interviews to the MSTP Director. These evaluations are crucial for the Director in his meetings with Medical Admissions, and in special cases, Committee members attend the Medical Admissions Committee to provide direct feedback.

Newsletter – Lynn Hassman leads this committee, which is responsible for the content and the publication of the annual newsletter "M.D./ Ph.D. Perspectives." The newsletter is published in September and updates faculty, students, applicants and staff on happenings in the program and with students.

Research In Progress – In 2008-2009, Carrie Hall and Josh Meisner lead this committee, coordinating food, room set-up and clean-up after the monthly RIP meetings. Please contact the RIP Committee if you have allergy or other food limitations.

Scientific Programs – Jeff Sturek convenes the Science Advisory Committee, which coordinates the Molecular Medicine Seminar Series, Distinguished Lecture Seminar, the annual retreat, and the student roundtable discussions including "Tell It Like It Is" and Predoctoral Fellowship Workshops.

Social –Liz Thompson is the current head of this committee, which coordinates the the Second Look Weekend Saturday dinner party, the Holiday Party, and monthly social activities throughout the year. If you have a particular interest or idea, please contact her!

Benefits for Committee Chairs – Student chairs gets the first opportunity to attend the Annual M.D./ Ph.D. Student Conference held in Keystone, CO every summer with all expenses covered by the Program and can list their service on their CV. They also receive a free unexcused absence from required events.

VIII. Student Requirements

ALL Students are encouraged to participate in recruiting activities while they are in the Program.

First Year

1. Attend MSTP 1st Year Orientation.
2. First Years are expected to attend the monthly RIP Dinners. If a student is unable to attend an RIP Dinner because of a professional/academic conflict please inform the Program Director in advance by email.
3. Expected to attend the student-run Molecular Medicine Seminar Series.
4. Attend Annual Retreat.
5. Attend monthly advisory lunches with the Director and/or Associate Directors.
6. Select a summer rotation. A key decision for First Year students will be to select a summer research rotation. Students have plenty of time but should strive to make decisions no later than March 30. There are many different mechanisms to help students to do this including use of the MSTP website; meeting with the Director and Associate Directors; doing short reading courses; attendance at the RIP and Molecular Medicine Seminar Series; etc. First Years are also exposed to many potential Ph.D. mentors in their courses. In January, students are prompted by the Program Assistant Director to set up an appointment with the Director to discuss possible rotation mentors. (*See Appendix D – How to Choose a Mentor*)
7. Successfully complete all coursework requirements. If tutoring is needed, please contact the Director, Assistant Director, or the Office of Student Academic Support and Strategic Programs.
8. Select and schedule a 1/2 day preceptorship (1 Fall and 1 Spring) with a physician-scientist from the "MSTP Preceptor Contact List." These sessions are in addition to the three required for the POM1 sessions.
9. Start planning and organizing MSTP Advisory Committee (see section V).
10. Contact the MSTP Assistant Director if receive any unexpected program related bills for tuition, fees, etc., or if the stipend does not seem correct (or do not receive a stipend payment).

Second Year

1. Continue to attend the monthly RIP Dinners. If a student is unable to attend an RIP Dinners because of a professional/academic conflict please inform the Program Director in advance by email.
2. Continue to attend Molecular Medicine Seminar Series.
3. Assist with 1st Year Orientation.
4. Attend Annual Retreat.
5. Attend bimonthly advisory lunches with Director and/or Associate Directors.
6. Complete MSTP Annual Progress Report and attend MSTP Advisory Committee Meeting the Program Assistant Director will schedule.
7. Attend the Annual MSTP Clerkship meeting with Dr. Allison Innes.
8. Make a decision on Mentor and Ph.D. program. Complete Graduate School of Arts and Sciences (GSAS) or Graduate School of Engineering and Applied Sciences (GEAS) Application. The Program Assistant Director will give instructions and prompt Second Years in November to complete the application by January 15.
 - a. Once a student makes a decision on a mentor. The student and the mentor will decide which Ph.D. degree would be best for the student to pursue. After this discussion, the mentor should contact the Ph.D. granting department and the Director of the BIMS Program so the student can gain admittance.
9. Successfully complete all coursework requirements. If tutoring is needed, please contact the Director, Assistant Director or the Office of Student and Strategic Programs.
10. Contact the MSTP Assistant Director if receive any unexpected program related bills for tuition, fees, etc., or if the stipend does not seem correct (or do not receive a stipend payment).

Third through Ph.D. Completion Years

1. Continue to attend the monthly RIP Dinners. If a student is unable to attend an RIP Dinners because of a professional/academic conflict please inform the Program Director in advance by email.
2. Continue to attend Molecular Medicine Seminar Series.
3. Attend Annual Retreat.
4. Complete MSTP Annual Progress Report and attend MSTP Advisory Committee Meeting the Program Assistant Director will schedule.
5. Successfully complete all Ph.D. requirements as instructed by Ph.D. granting department.
6. Contact the MSTP Assistant Director if you receive any unexpected program related bills for tuition, fees, etc., or if the stipend does not seem correct (or you do not receive a stipend payment).

Nearing the end of Ph.D.

1. Contact and schedule a meeting with Dr. Allison Innes in the Medical School Student Affairs Office to discuss and plan transition back to Medical School.

2. Notify Program Assistant Director regarding date dissertation defense is scheduled and date expected to transition to 3rd Year of Medical School.
3. If student determines a need to complete a Transition Course or to have a reorientation to the clinics, contact Associate Director for Curriculum.
4. Complete all necessary forms for GSAS or GEAS to have Ph.D. conferred.
5. Successfully complete defense of dissertation per Ph.D. granting department requirements.

Selectives (aka Clerkship) Years

1. Continue to attend the monthly RIP Dinners if possible. If a student is unable to attend an RIP Dinners because of a professional conflict please inform the Program Director in advance by email and an excused absence will likely be granted.
2. Continue to attend Molecular Medicine Seminar Series.
3. Attend Annual Retreat (if possible).
4. Complete MSTP Annual Progress Report and attend MSTP Advisory Committee Meeting the Program Assistant Director will schedule.
5. Successfully complete Medical School Selectives.
6. Contact the MSTP Assistant Director if receive any unexpected program related bills for tuition, fees, etc., or if the stipend does not seem correct (or do not receive a stipend payment).
7. Enjoy the final year in the Program!

IX. Curriculum

A critical aspect of the UVA MSTP is that physician-scientist training is integrated across all years. Thus, MSTP Students are not simply medical students for two years, Ph.D. students for three plus years, and medical students again for one to two more years.

Year 1 – 1st Year of Medical School – The curriculum for the MSTP students has been optimized for promoting their development as physician scientists. All MSTP students take Graduate School's (GSAS) course, Cell Tissue & Function (BIMS 512, aka "Grad Cell" or "Cell Biology") in place of the Medical School's course, Cell & Tissue Structure (MED 601) in the their first (Fall) semester. In addition, MSTP students take Graduate School's (GSAS) Biochemistry: Macromolecular Structure and Function (BIMS 503, aka "Grad Biochem.") as a substitute for the Medical Biochemistry Course (MED 606).

Course schedule (see Appendix E – Student Planning Calendar for dates)

The First Year of Medical School is known as "Foundations of Medicine"

- 1st full week of August, Medical School Orientation and Cells to Society brief course.
- 2nd full week of August, MSTP students begin Medical School Curriculum by starting Gross Anatomy and Practice of Medicine 1 (POM1).

- 3rd full week of August, Graduate School (GSAS) courses begin and 1st year Students begin Grad Cell, Grad Biochem, and BIMS 813 - Topics in the Molecular Basis of Human Disease (MBHD).
- During the Fall semester, students are expected to take a computer based Histology course tutorial with the guidance of Medical Cell and Tissue Structure course director.
- The week prior to Thanksgiving, 1st years take their final exam in Gross Anatomy.
- The week after Thanksgiving, 1st years begin Medical and Molecular Genetics in addition to POM1, Grad Cell and Grad Biochem until the Winter Break exams.
- In January, 1st year begin 2nd semester of Medical School and take Neuroscience, Physiology, Human Behavior, Social Issues in Medicine, and POM 1 along with MBHD.
- 2nd semester will end at the end of April with exams. After a 2nd Spring Break, students will begin the 2nd year Medical School curriculum with Pathology, Pharmacology, and POM 2. These courses break for the summer at the beginning of June.
- From June to the end of July/ beginning of August, students are to complete a lab rotation.

1st Year Course Descriptions

Biochemistry: Macromolecular Structure and Function (BIMS 503) – This is an integrated general Biochemistry course that provides the necessary background at the professional level for careers in a variety of biological and physical sciences. A major emphasis is on examination of protein structure, function and proteomics. This course is required by most Ph.D. degree programs.

Cell Tissue & Function (BIMS 512) – A beginning graduate course in molecular cell biology examining the functional organization of eukaryotic cells and the interactions of cells with their surroundings. General and specialized forms of cell signaling are discussed, and events involved in regulating cell proliferation and differentiation are emphasized. This course is required by nearly all Ph.D. degree programs. Five lecture hours.

Exploratory 1 (MED 613) – Students will learn about the social, economic and cultural context of the practice of medicine. Students will identify and understand the interrelationships between the socio-cultural environment and the occurrence, prevention and treatment of disease. Students will also identify and begin to nurture the values that characterize a humanistic practice of medicine and an ethic of service.

Gross Anatomy (MED 602) – The structure and function of the body. This is the basic biological course in which students learn the morphological setting upon which clinical knowledge and experience are built. In this course, anatomy is approached from gross structural and embryological perspectives. (For MSTP Students a journal club is also required.)

Introduction to Human Behavior (MED 616) – Mental disorders and the clinical skills necessary to diagnose and treat such conditions.

Medical and Molecular Genetics (MED 605) – An overview of the basic and clinical aspects of the rapidly changing field of human genetics. The course begins with the building blocks of inheritance: DNA structure, replication, transcription, and translation. Included is the area of human cytogenetics and a number of important clinical cytogenetic abnormalities.

M.D./ Ph.D. Research in Progress Colloquium (BIMS 817/818) – The Research in Progress Colloquium is a series of research seminars and short talks by students in our combined M.D./Ph.D. Program. The major goals of the course are to familiarize students with key research areas of importance for training as physician scientists, and to develop the student's presentation skills. Students are required to give a minimum of one oral presentation per year to their fellow students and to selected faculty members who have expertise in the area of presentation. Students also are required to attend presentations of other students and to participate in group discussions. In addition to research presentations by students, there will also be presentations by faculty members in areas of significance for training of physician scientists. Grading (S/U) will be based on the quality of the students' presentation, as well as the extent of their participation in group discussions.

Neuroscience (MED 608) – Emphasis is on the structure and function of the central nervous system. Neural disease is discussed to provide a context for understanding normal neural function and to illustrate the reasoning process that uses an understanding of functional neuroanatomy to localize neural dysfunction.

Pathology (MED 622) – The study of pathology beginning at the cellular and molecular level, examining the ways in which cells may be injured, adapt to injury, or die.

Pharmacology (MED 630) – The basic mechanisms of action of the major drug classes, the fundamentals of their therapeutic use, and the major representative drugs of each class.

Physiology (MED 610) – An integrated study of the histology and physiology of the major organ systems of the human body, including the autonomic nervous system, cardiovascular system, urinary system, respiratory system, digestive system, endocrine system, and reproductive systems.

Practice of Medicine 1 (MED 615) – The understanding of the patient's humanity and how interaction and treatment affect patients and their family and community. Provides a format for actively learning the fundamental attitudes, skills, and knowledge required of a physician.

Topics in the Molecular Basis of Human Disease (BIMS 813/814) – The course will address the biologic/molecular mechanisms related to selected disease processes as

they affect specific cell types, tissues, and/or organic systems. A strong focus of the course will be the discussion of the basic pathobiologic processes and the contemporary biomedical translation of experimental science to the understanding and treatment of human disease.

Social Issues in Medicine: This course helps students recognize and analyze the interrelationships between socio-cultural environments and the occurrence, prevention, and treatment of disease. Students also identify and nurture values that characterize a professional and humanistic practice of medicine and an ethic of service. It is offered fall and spring, and MSTP students generally take it in the spring.

Year 2 – 2nd Year of Medical School – Students take the 2nd Year of Medical School Coursework. Unlike the first year of medical school, students take the same course the whole year and the Final exams in these courses are cumulative. The exceptions are Introduction to Psychiatry and Epidemiology.

Course schedule (see Appendix E – Student Planning Calendar for dates)

The Second Year of Medical School is known as “Core Systems”

- The 2nd full week of August, students continue their studies in Pathology, Pharmacology and POM 2 in addition to Microbiology and Introduction to Psychiatry.
- In December, students complete Introduction to Psychiatry.
- In January, students continue their studies in Pathology, Pharmacology, Microbiology and POM in addition to Epidemiology.
- Courses end in the middle of March.
- Students are expected to take USMLE Step 1 by the end of April.
- In May, students take Basic Patient Skills Course and Clinical Connections in preparation of entering their first Clerkship (Optional).
- From May to the end of June, students have their first Clerkship experience. This is optional as some student choose to go into their Ph.D. Mentor’s Lab instead of doing a Clerkship. Also students who have not decided on a lab or not had at least 2 lab rotations do not begin clerkships as they will be doing lab rotations instead.

2nd Year Course Descriptions

Epidemiology (MED 632) – A combination of the basic clinical sciences of biostatistics, clinical epidemiology, health services research, and informatics, aiming to provide a better understanding of the relationships among biologic discoveries, patient characteristics, treatment options, systems, and outcomes.

Introduction to Psychiatric Medicine (MED 620) – The goal of this course is to help you to gain both a factual understanding of mental disorders and the clinical skills necessary to diagnose and treat these conditions. The course is designed to provide a "bench to bedside" experience. At the end of this course, you should feel more comfortable with the prospect of managing mental disorders either alone or with psychiatric consultation.

M.D./ Ph.D. Research in Progress Colloquium (BIMS 817/818) – The Research in Progress Colloquium is a series of research seminars and short talks by students in our combined M.D./Ph.D. Program. The major goals of the course are to familiarize students with key research areas of importance for training as physician scientists, and to develop the student's presentation skills. Students are required to give a minimum of one oral presentation per year to their fellow students and to selected faculty members who have expertise in the area of presentation. Students also are required to attend presentations of other students and to participate in group discussions. In addition to research presentations by students, there will also be presentations by faculty members in areas of significance for training of physician scientists. Grading (S/U) will be based on the quality of the students' presentation, as well as the extent of their participation in group discussions.

Microbiology (MED 618) – An identification of the most likely causative agents of disease and how to appreciate differential diagnoses of infectious diseases based on symptoms, epidemiology, and laboratory tests.

Pathology (MED 622) – The study of pathology beginning at the cellular and molecular level, examining the ways in which cells may be injured, adapt to injury, or die.

Practice of Medicine 2 (MED 625) – An expansion of the student's knowledge base to include clinical information, differential diagnoses, pathophysiology, and treatment. Develops problem-solving abilities and establishes the practices of study and evaluation for use throughout a professional career.

Pharmacology (MED 630) – The basic mechanisms of action of the major drug classes, the fundamentals of their therapeutic use, and the major representative drugs of each class.

Year 3 – 1st Year in Graduate School – Students receive a total of eighteen credits for the first two years of medical school coursework that can be applied to the 54 topical credit hours for a Ph.D. from the GSAS. In addition as part of the MSTP integrated curriculum, students have accumulated up to 15 topical credit hours (starting in 2005-06) for GSAS courses taken in the first two years. Typically, Students need only accumulate a total of 21 additional topical credit hours for the Ph.D. As a consequence of the integrated curriculum MSTP students have fulfilled most of the core course requirements of the Ph.D. programs. Therefore, MSTP students are expected to be able to fulfill most of their remaining Ph.D. coursework in the first year of Graduate School and have significant time in the laboratory.

Decisions regarding what courses student need to take are determined by the degree granting Ph.D. Program and the MSTP Curriculum Committee.

Year 4-6 – 2nd-4th Years in Graduate School – These years are devoted to primarily to the completion of dissertation research projects and one to two additional advanced elective specialty courses as desired (these courses should be taken on an audit basis unless instructed otherwise by the Ph.D. Programs).

Year 7 and 8 – 3rd and 4th Years in Medical School – Upon completion of the dissertation project and defense of the thesis, students are required to complete their clinical training for the M.D. degree. Students are granted eight months of elective credit for completion of their Ph.D. thus reducing the number of clerkships the students need to take to complete their M.D. degree. It takes 14 months for students to complete the required clerkships. However, you must also allow time for residency interviews, possible illness, elective clerkships, and/or additional selectives. As such, you should try to complete your Ph.D. requirements and return to the third year of Medical School (clerkships) no later than November if you have completed a clerkship prior to starting Graduate School, or October if you have not. Otherwise you may have difficulty completing Medical degree requirements in time to graduate the second May following return to Medical School and may be forced to spend an additional full year in the MSTP.

Required Clerkships

There are 61 weeks of required clerkships for MSTPs:

- Geriatrics (2 weeks)
- Peri-operative and Acute Care (2 weeks)
- Basic Science for Careers (2 weeks) – waived for MSTPs
- Medicine (8 weeks + two 2-week selectives)
- Surgery (8 weeks + two 2-week selectives)
- Obstetrics/Gynecology (4 weeks + 2 week selective)
- Psychiatry (4 weeks + 2 week selective)
- Family Medicine (4 weeks)
- Neurology (4 weeks)
- Pediatrics (8 weeks)
- Advanced Critical Elective (aka "ACE") (4 weeks)
- Dx/Rx US Health Care System (1 week)

X. Biomedical Sciences Graduate Programs (BIMS)

Biomedical Sciences Graduate Programs (BIMS) – The Graduate Programs within the University of Virginia School of Medicine are organized into seven entry portals as outlined below. These BIMS Programs are responsible for all graduate student recruiting and admissions, and will also oversee your graduate training in Grad 01 along with the MSTP and Ph.D. Program. For example, the BIMS Programs offer advice on course selection, and rotations (if required although most MSTP have already selected their mentor by this time), and also have journal clubs, workshops, retreats, and a seminar series. Typically MSTP students select their Ph.D. mentor by no later than December of Med02, and in consultation with their mentor select an appropriate BIMS Program and Ph.D. Granting Program or Department. You must then formally apply to the BIMS Program by no later than January 15 of Med 02. Acceptance is usually automatic as long as you are good standing with the MSTP, but you MUST submit the application to ensure a slot is reserved for you. You should consult your Ph.D. Mentor, the MSTP Director, MSTP Assistant Director, and the Director of the BIMS Program of interest, to help you

with your decision. As a BIMS graduate student, you are free to change your BIMS Program designation anytime during the first year of grad school although MSTP students rarely do this. The flexible structure of BIMS was designed primarily to allow entering graduate students flexibility in selecting a research topic area and mentor but most MSTP students have finalized their mentor selection during the first two years of the MSTP and prior to actually transitioning to Grad School in Year 03. In rare circumstances, MSTP students may select a BIMS Program but defer selection of their Ph.D. mentor until Grad01. In this case, students will consult with the Director to identify the appropriate BIMS for them. The BIMS website is www.bims.virginia.edu.

Name of Program	Program Director Contact Information	Program Administrator Contact Information
Biochemistry, Molecular Biology & Genetics (BMBG)	Joel W. Hockensmith, Ph.D. jwh6f@virginia.edu 924-1230 Jordan # 1102	Debra E. Sites der8v@virginia.edu 924-1997 Jordan # 6007
Biomedical Engineering (BME)	Jeffrey Holmes, Ph.D. bmegrad@virginia.edu 243-6321 MR5 # 2014	Meg Harris bmemeg@virginia.edu 243-6309 MR5 # 2010
Molecular Cell & Developmental Biology (MCDB)	J. David Castle, Ph.D. Jdc4r@virginia.edu 924-1786 Jordan # 3111	Mary T. Hall, M.Ed. mthall@virginia.edu 924-2835 Jordan # 3031
Microbiology, Immunology & Infectious Diseases (MII)	J. Thomas Parsons, Ph.D. jtp@virginia.edu 924-5395 Jordan #7315	Sandra W. Weirich sww6j@virginia.edu 243-2776 Jordan # 7012
Molecular Medicine (MolMed)	Kevin R. Lynch, Ph.D. krlynch@virginia.edu 924-2840 Jordan # 5227	Pamela R. Mullinex prm8b@virginia.edu 982-6390 Jordan # 1102
Neuroscience (NESC)	Suzanne M. Moenter, Ph.D. moenter@virginia.edu 982-0076 Multistory Building 7145	Tracy L. Mourton t1m2x@virginia.edu 982-4285 Jordan # 1352
Structural, Computational Biology & Biophysics (SCBB)	Robert K. Nakamoto, Ph.D. rknakamoto@virginia.edu 982-0279 Jordan #4-55	Pamela R. Mullinex prm8b@virginia.edu 982-6390 Jordan # 1102

XI. Basic Sciences Departmental Ph.D. Requirements

The goal of our graduate training programs is to provide students the necessary knowledge, intellectual capabilities, and technical skills to conduct outstanding state-of-the-art research in a wide range of biological and biomedical areas. Ph.D. training is

begun in one of the seven Interdisciplinary BIMS Graduate Program Groups that provide students a foundation for eventual specialized training in individual laboratories and Advanced Graduate Specialty Training Areas. Students remain associated with a BIMS program throughout their Ph.D. training but choose a degree granting department from the nine departments or degree-granting interdisciplinary graduate programs in the School of Medicine listed below. These degrees are awarded through the Graduate School of Arts and Sciences (GSAS). In special circumstances, MSTP students may also obtain Ph.D. training in affiliated Departments within the University of Virginia including Physics, Biology, or one of the Engineering Departments.

GSAS requires that PhD students complete a minimum of 72 hours of graduate course work. 54 of these hours must be in courses other than non-topical research. MSTP Students are expected to complete the remaining topical credit hours within their first year in Graduate School (Grad 1). A brief description of degree requirements for each program is listed below, although for details please contact the designated Graduate Advisor.

1. *Biochemistry and Molecular Genetics (BMG)*

Graduate Advisor – Dr. Joel Hockensmith, jwh6f@virginia.edu

The department represents a broad range of research interests with special emphasis on biochemistry of the nucleus. To reflect the increasing use of genetics, molecular biology and computational biology in identifying and characterizing the structure and activities of important cell constituents, the BMG faculty includes geneticists, biochemists, molecular biologists, and biophysicists, whose research focuses on computational biology, DNA replication, transcriptional regulation, chromatin folding, cell cycle traverse, genetic instability, nuclear import, structure of membrane and nucleoprotein complexes, extracellular matrix formation, protease function, and antibody selectivity and design.

Requirements

Courses

BIMS 503 (Macromolecular Structure & Function)

BIMS 512 (Cell Structure & Function)

BIMS 811 (Gene Structure & Expression)

BIMS 710 (Research Ethics)

BIOC 815/816 (Journal Club “Masterpiece Theater”)

BIOC 813/814 (Colloquium)

Additional research courses and other graduate courses in appropriate fields such as biology, chemistry, biochemistry, math, physics, etc. selected by the student with the advice of their BMG Advisory Committee.

Even though MSTP Students will not be registered for Journal Club and Colloquium after their Grad 1 year, attendance and participation in these Departmental functions will be expected.

Advance to Candidacy

Qualifying Exam – Thesis Proposal Defense

Dissertation Defense requires a written dissertation and both a public and private defense of the dissertation.

2. Biomedical Engineering

Graduate Advisor: Dr. Jeffrey Holmes, holmes@virginia.edu

The Department of Biomedical Engineering offers a variety of degree programs for students with different goals. The Master of Engineering degree develops competence in the direct application of engineering to health care, for instance instrumentation, computer applications, image processing, and rehabilitation engineering.

On the other hand, students planning careers in research, advanced development and design, or teaching usually pursue the Master of Science degree, which requires a thesis based on an independent research project.

In the Ph.D. program, further advanced courses are followed by dissertation research in the biotechnology areas mentioned above, in molecular and cellular biology, or in the fields of bioelectricity, biotransport, or biomechanics.

Requirements

See BME Handbook

(http://bme.virginia.edu/grad/2007_Grad_Student_Handbook.pdf)

3. Biophysics Interdisciplinary Graduate Program

Graduate Advisor: Dr. Robert Nakamoto, rknakamoto@virginia.edu

The Interdisciplinary Program in Biophysics at the University of Virginia is comprised of more than two dozen faculty members in the College of Arts and Sciences, the School of Medicine, and the School of Engineering and Applied Science. The Biophysics Ph.D. training program is designed to allow a maximum degree of flexibility so that students with varying backgrounds and research interests can be prepared to investigate the broad range of scientific problems encompassed by biophysics. The current focus of the program is on molecular and cellular biophysics, with outstanding strength particularly in the areas of structural biology and membrane biophysics.

Requirements

Courses

BIMS 503 (Macromolecular Structure & Function)

BIMS 512 (Cell Structure & Function) or

BIMS 811 (Gene Structure & Expression)

BIOP 506 (Experimental Methods of Molecular Biophysics)

BIOP 801 (Biophysics Seminar)

BIOP 805 (Biophysical Literature – Journal Club)

BIMS 710 (Research Ethics)

Advanced Courses:

BIOP 802 (Advanced Protein Crystallography)

BIOP 800 (Magnetic Resonance Spectroscopy of Macromolecules)

PHY 813 (Structure and Function of Biological Membranes)

BIOC 508 (Computer Analysis of DNA Protein Sequences)

BIMS 832 (Graduate Physiology)

Advancement to Candidacy

Qualifying Exam – The student will prepare a research proposal and defend it before his/her Proposal and Research Committee. The Graduate Advisor of the Biophysics program is an ex-officio member of the examination committee. This examination will be open to the faculty only. A general question period will be included on subjects determined by the committee. Following the examination, the committee will formulate plans for more courses or other activities if they see major deficits in the student's training. The student will be advanced to candidacy for the Ph.D. degree upon satisfactory performance in this examination.

Dissertation Defense – The dissertation, presented in partial fulfillment of the requirements for the Ph.D. degree in Biophysics at the University of Virginia must be based upon original research carried out by the candidate under the guidance of the dissertation advisor(s) and research committee. The dissertation must be authored by the candidate and contain the primary data obtained in the dissertation research. The defense of the dissertation shall consist of a public dissertation seminar and the oral examination by the examining committee. The time and place of the thesis seminar must be announced in advance, normally the regularly scheduled Biophysics Seminar. The examinations shall be open to the faculty only.

4. Department of Cell Biology

Graduate Advisor: Dr. J. David Castle, jdc4r@virginia.edu

The department has developed great strengths and strong national reputation in a number of research areas, including cell adhesion, cell migration, intracellular transport and trafficking and reproductive cell biology. In addition to these research accomplishments the faculty continues achieving excellence in its medical school and graduate school teaching missions. A new emphasis for research will be the problem of morphogenesis, involving a combination of cellular/ molecular, genetic and advanced imaging approaches to discover the basic principles underlying tissue, organ and organism development.

Requirements

See Cell Biology Handbook

(http://www.healthsystem.virginia.edu/internet/bims_cdb/cdbforms/CDB-Handbook-2007.pdf)

5. Department of Microbiology

Graduate Advisors: Dr. Timothy Bender, tpb3e@virginia.edu, Dr. Amy Bouton, ahb8y@virginia.edu, and Dr. AJ Roberts, ajroberts@virginia.edu

The Department of Microbiology at the University of Virginia offers both pre-doctoral and postdoctoral training programs in a variety of subdisciplines. This educational program is based on a solid foundation of state-of-the-art research conducted in the laboratories

of the departmental faculty. Modern Microbiology involves studying biological systems at the molecular level and is among the most rapidly developing areas in the sciences. The Microbiology Department at the University of Virginia reflects this contemporary flavor. The research programs, which cover the areas of virology and human retroviruses, microbial pathogenesis, cancer and signal transduction, gene expression and cell cycle regulation, and immunology, all have strong molecular components.

Requirements

Courses

BIMS 503 (Macromolecular Structure & Function)

BIMS 512 (Cell Structure & Function)

BIMS 811 (Gene Structure & Expression)

BIMS 710 (Research Ethics)

MICR 881/882 (Colloquium in Microbiology) or BIMS 835/836 (Colloquium in Immunology)

2 advanced courses:

Of the 4 total advanced courses required, at least 2 must be drawn from the following group of "core" courses:

BIMS 803 (Fundamental Immunology)

BIMS 808 (General & Molecular Genetics)

MICR 809 (Virology)

MICR 810 (Microbial Pathogenesis)

MICR 815 (Molecular Basis of Cancer)

Advance to Candidacy

Qualifying Exam – Thesis Proposal Defense

Dissertation Defense requires a written dissertation and both a public and private defense of the dissertation.

6. Neuroscience Interdisciplinary Graduate Program

Graduate Advisor: Dr. Suzanne Moenter, moenter@virginia.edu

The functions of the nervous system in health and disease and their relationships to behavior are topics addressed in the Neuroscience Graduate Program at the University of Virginia. Over 60 faculty members from 17 departments of the School of Medicine and the College of Arts and Sciences work together in the interdisciplinary program of graduate training leading to the Doctor of Philosophy degree in Neuroscience. The program provides graduate courses in various aspects of neuroscience and a wide array of research opportunities so that students in the program obtain the skills and background necessary for original and significant research and for preparation to teach neuroscience at colleges, universities and medical schools.

Requirements

See Neuroscience Handbook

(<http://www.med.virginia.edu/neuroscience/Forms/Handbook/General.pdf>)

7. Department of Pharmacology

Graduate Advisor: Dr. Paula Barrett, pbarrett@virginia.edu

The Department of Pharmacology is one of six basic science Departments within the School of Medicine at the University of Virginia. The faculty includes scientists with a diverse range of research interests drawing from the established scientific disciplines of chemistry, biology, physics and engineering. Traditionally, Pharmacology has been considered an applied science. However, with the development of biological chemistry, molecular biology, structural biology, neuroscience and electrophysiology, Pharmacology has become a diverse science that probes basic mechanisms of molecular and cellular function with the knowledge that unraveling these mechanisms will lead to new therapeutic approaches to a variety of diseases. The Department of Pharmacology, therefore, has a unique role within the basic biomedical sciences: to conduct investigations into the fundamental principles of cell function and translate these findings to clinical applications.

Requirements

Courses

- PHAR 701/702 (Departmental Seminar)
- PHAR 811/812 (Journal Club)
- BIMS 503 (Macromolecular Structure & Function)
- BIMS 512 (Cell Structure & Function)
- BIMS 811 (Gene Structure & Function)
- BIMS 710 (Research Ethics)
- BIMS 832 (Graduate Physiology)
- PHAR 901 (Human Pharmacology)
- PHAR 902 (Molecular Characterization of Drug Targets)

Advancement to Candidacy

Qualifying Exam – Comprised of two parts: a grant-style written document, or proposal, and an oral examination/defense of this document. Five Examination Committee members selected by you and your mentor will evaluate both parts of the exam. The Graduate Committee will make the final decision concerning your eligibility for Advancement to Candidacy in the Ph.D. program.

Dissertation Defense – A written dissertation based on original research contribution is prepared, and the document presented to the dissertation committee. If the thesis is approved by the members of the committee, it forms the basis for an oral examination before that committee. An integral part of the final exercise is the presentation of a public seminar wherein the work is summarized. This seminar is to precede immediately the closed portion of the dissertation defense.

8. Department of Molecular Physiology & Biological Physics

Graduate Advisor: Dr. Robert Nakamoto, rknakamoto@virginia.edu

An interdisciplinary approach employing advanced methods of Molecular Biology and Structural Biophysics is the hallmark of modern scientific research, whether fundamental, clinical or translational. The process involves obtaining information about

the structure and function of cells at the molecular and even atomic level, and integrating it for understanding the function of the entire organism. The Department of Molecular Physiology and Biological Physics aims to promote, at all levels, the understanding of the function of living systems. Today this understanding has to be based on knowledge of atomic and molecular structure and function, just as the classical physiology of Harvey and his successors was based on the structural studies of Vesalius and his fellow anatomists. Thus, modern molecular physiologists and biophysicists may investigate the function of the heart by cloning a membrane channel or transport protein, expressing it and studying its kinetics through patch clamping in a model cell system, while exploring the relationship between molecular structure and function through crystallography and spectroscopy of the protein. The major aims, as of all science, are to understand the general laws of nature and, for physiology, how they operate in living systems. The ultimate aim is to exploit this knowledge for the betterment of human health. Our research-intensive program at the University of Virginia is designed to train students to identify significant biological problems and use the most advanced and modern methods for solving them. The emphasis of our department and expertise in molecular physiology and biophysics provide a unique environment for training graduate students and postdoctoral fellows. This interdisciplinary approach also integrates the insights gained at the molecular and cellular levels into the broader framework of organ function, with the aim of understanding the function of living systems at all levels.

Requirements

Courses

BIMS 503 (Macromolecular Structure and Function)
 BIMS 710 (Research Ethics)
 BIMS 811 (Gene Structure, Expression and Regulation)
 BIMS 812 (Cell Structure and Function)
 PHY 801/802/803/434 (Seminar in Physiology)
 and Either
 BIMS 832 (Graduate Physiology)
 PHY 704 (General Physiology)
 Elective Courses – Partial listing
 BIMS 813 (Topics in the Molecular Basis of Human Disease)
 BIOC 508 (Computer Analysis of DNA and Protein Sequences)
 BIOP 507 (Thermodynamics and Kinetics of Biological Systems)
 BIOP 802 (Advanced Protein Crystallography)
 BIOP 803 (Magnetic Resonance Spectroscopy of Macromolecules)
 PHY 506 (Experimental Approaches in Molecular Physiology and Biophysics)
 PHY 813 (Structure and Function of Biological Membranes)
 PHY 862 (Neurophysiology)
 and Either
 BIMS 852 (Vascular Biology)
 PHY 852 (Vascular Biology)

Advancement to Candidacy

Qualifying exam – “Area Paper”
 Thesis Proposal Defense

Dissertation Defense – requires a public seminar followed immediately by a private defense with Thesis Committee

9. Department of Pathology

Graduate Advisor: Dr. Isa Hussaini, imh5c@virginia.edu

The Molecular and Cellular Basis of Disease (MCBD) Ph.D. program is designed to elucidate the mechanisms of disease processes, with a particular emphasis on the skills necessary to perform translational research.

There are over 50 faculty members in the Program who are engaged in different aspects of diseases, including prostate cancer, breast cancer, infectious diseases, immunological disorders, brain tumors, leukemia, hypertension, medical automation, robotics and artificial intelligence in managing the laboratory. In addition to basic laboratory skills the program offers opportunities for collaborative work with top-ranked and internationally recognized pathologists as part of the students' training.

Requirements

Courses

- BIMS 503 (Macromolecular Structure & Function)
- BIMS 512 (Cell Structure & Function)
- BIMS 811 (Gene Structure & Function)
- BIMS 710 (Research Ethics)
- BIMS 813/814 (Topics in Molecular Basis of Human Disease)
- BIMS 832 (Graduate Physiology)
- BIMS 857/858 (Topics in Medical Pathology)
- BIMS 849/850 (PRPR Colloquium)
- BIMS 845/846 (Pathology Department Research Seminar)

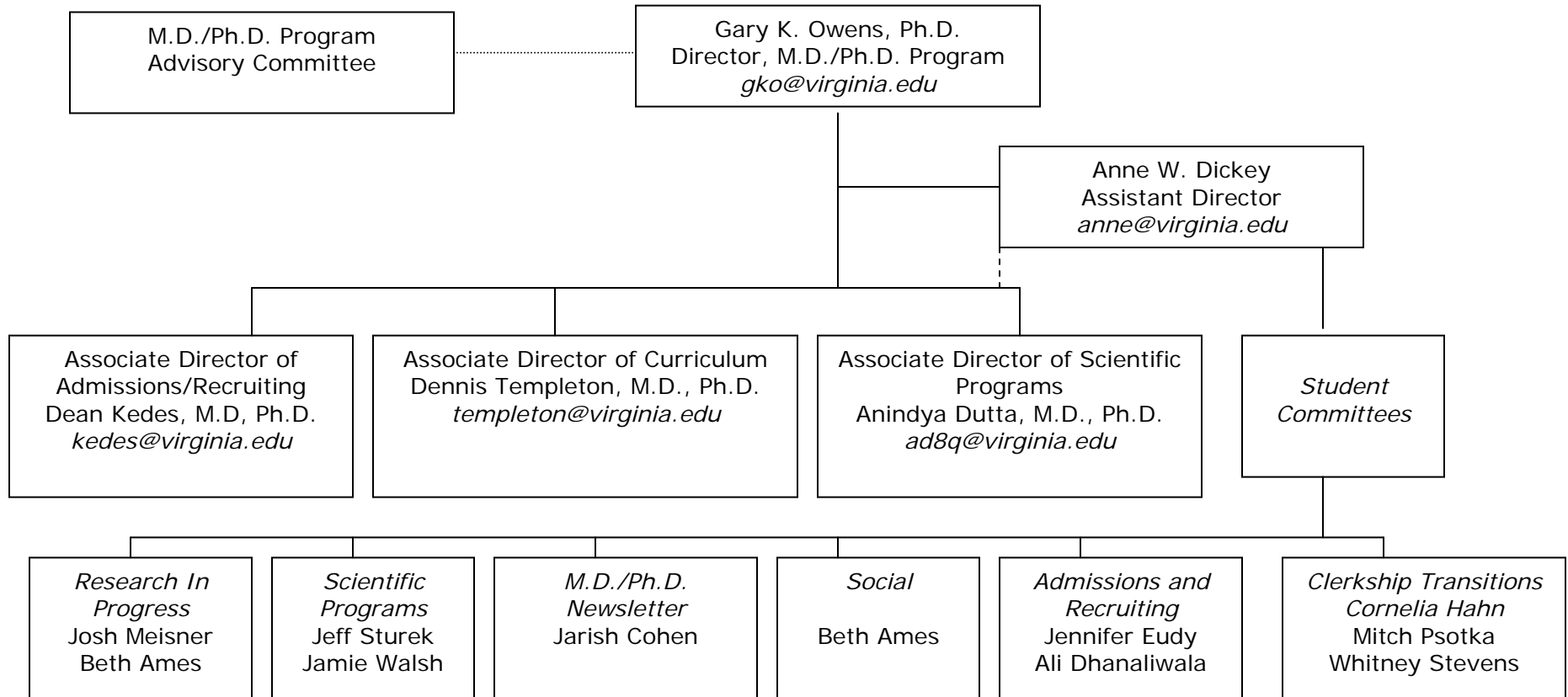
Advancement to Candidacy

Qualifying Exam – In consultation with the student's mentor, the student will prepare for the Qualifying Exam, which consists of writing an NIH-style grant on the proposed thesis work. This Exam, specified in more detail elsewhere, will consist of a written document between 18 and 20 pages in length (double spaced) which will be defended orally before the thesis committee. The Exam should present a logical, achievable research plan for the Thesis, outlining the biological problem with a relevant literature review, and providing literature evidence and preliminary laboratory results that demonstrate the achievability of the project. The Qualifying exam must be presented by September of the Third Year.

Dissertation Defense – Graduation requirements include a written thesis that conforms to University specifications, a closed oral defense of the document and research conclusions, and a public oral defense (seminar presentation). The written thesis document should include an adequate background information chapter and a chapter outlining future directions for the research.

Appendix A:

M.D./Ph.D. Program Organizational Structure at the University of Virginia, 2008-2009



Appendix B – Physician-Scientist Advisory Committee (adapted from Rebecca Obeng's Summary)

1. Purpose of committee

The main purpose of the advisory committee is to provide the student career advice to optimize their professional growth/development and integration of the clinical and scientific aspects of the student's future career. The committee should not only serve as a source of constructive criticism, advice, knowledge, and career information but also as a support system for the student during the student's career training.

2. Time commitment

Time commitment for the committee is minimal. The MSTP requires that you meet with your committee only once per year (in the Spring when scheduled by the Assistant Director). You may schedule additional meetings as necessary if there are any pertinent problems and issues that arise including possible mentor conflict resolution, etc. You should also feel free to contact individual PSA Committee members as needed for professional or personal advice and guidance.

3. Obligations of committee members

Disclaimer: Positions on the committee are *not* permanent although you will always have two MSTP Director or Associate Director Members. If for any reason, the interests or focus, whether clinical, scientific, or otherwise, of the student changes, the student, with the help of the members, can add new members to replace past members. Also, if the commitment to the committee becomes overwhelming or if any member feels that he or she cannot meet the obligations of the committee at any point in time, the member can relieve his or herself from the committee.

- a. Serve as an advocate for the student.
- b. Advise the student and provide feedback on scientific progress in graduate school.
- c. Monitor the progress of the student as well as help to identify potential problems with the student's research project or mentor.
- d. help to integrate the student's research focus with the student's clinical interests when choosing residency programs or making career decisions.

4. Obligations of Student

- a. Provide copies of MSTP student progress report to the committee each year (due Feb. 1 when solicited by the Assistant Director).
- b. Keep members of the committee abreast of progress and changes in scientific and/or clinical interests.
- c. Inform all members in a timely fashion about any problems, requests, or changes in interest or the focus of the committee.
- d. Make use of resources made available by the committee members.

**Appendix C: M.D./PH.D. PROGRAM ANNUAL STUDENT PROGRESS REPORT
Due February 1st of each year**

Name:

Year of Entry:

Courses: (attach an unofficial transcript of completed courses and list any courses currently being taken below. You can access a record of your grades online through ISIS).

Total Graduate Credits Earned To Date:

Lab Rotations Completed or in Progress: (list faculty mentor, project title, and date):

Training Grants, including Training Grants not at UVA: (Include Name of Training Grant and Specific Years on it):

Clerkships Completed:

MSTP Student Advisory Committee Members:

Date of last MSTP Advisory Committee Meeting (You can get this date from the MSTP Assistant Director, if you do not know the date):

BIMS Program Selected:

Ph.D. Degree Program Selected:

Dissertation Mentor:

Ph.D. Program Candidacy Exam: (date of completion):

Dissertation Proposal Exam: (date of completion):

Dissertation Committee Members:

MD/PhD Program Representative:

Dates of Dissertation Committee Meetings:

Anticipated thesis defense date (or year):

What Elective Clerkships do you plan to take? (make your best guess)

What Clinical Rounds/Seminars do you attend on a regular basis?

Which Residency specialty do you plan to match?

Publications: (please attach a list with the following categories - published, submitted manuscripts, manuscripts in preparation, and abstracts) If none, indicate here: _____

Presentations at Scientific Meetings: (please attach a list with the meeting, where it was held, the date of your presentation, and the title of your talk or poster). If none indicate here: _____

Thesis Abstract/Summary and a Brief Description of Rotation Projects:
(please attach a <1 page summary)

Appendix D: Research in Progress, Clinical Case Conference, and Hotseat Guidelines and Suggestions

RIP Research Presentation Guidelines

1. Make your presentation approximately **25 minutes** long.
2. Two research presentations are usually scheduled for one RIP session.
3. In most cases, it is best to start your talk by outlining why the topic area is important, including relating your area of research to human disease.
4. During or following your talk, pose 3-5 questions to stimulate student participation.
5. Dr. Owens will ask all faculty not to ask questions at the end of your presentation until there have been at least 2 student questions. Faculty of course can ask points of clarification during talks.
6. Please include material in your RIP presentation that is incomplete or controversial. Don't feel like you should have a complete story before presenting data - take advantage of the great input your student colleagues can provide early in a project.
7. Include a slide near the end that summarizes ongoing studies and future directions.
8. Consider presenting a last slide to address the questions, "How does this research project relate to my long term plans of being a successful physician scientist?"
9. The RIP is intended to be MSTP's primary forum for exchange of research ideas so please let the Program Assistant Director or Dr. Owens know if you have additional suggestions.

Hints and Suggestions for Summer Rotation Presentations

By James Thomas

Research in progress is an excellent means by which aspiring scientists who must be adept at communicating information become so. People want to hear you talk, they are very forgiving, and you are (at least in the beginning) presenting a limited amount of information that you know well (even though it doesn't seem like it). All of this boils down to one thing: a low stress atmosphere. So above all, realize that the presentation is important for your development as a scientist, but nowhere near the end of the world.

With any presentation, I experience some trepidation at the thought of getting up in front of people and talking. They say that speaking in public is the most fearsome thing to the average American. Death is number two.

The following list is just something I wrote to aid you in preparing for a RIP presentation. You can take it with a grain of salt or you can study it like a daily devotional. Either way, it's just some advice that is there if you need it. Here it goes:

1. Know what you are talking about. This, of course, is rule number one. Not only does knowing relieve stress, but it gives you confidence which will only make the presentation that much better. Not to mention, you're wasting everyone's time (including your own) by not knowing what it is you are presenting. Now there are many ways to go about doing this. You all are gifted individuals who have excelled thus far in life and probably know very well how you learn best. This could be by doing, by seeing, by listening, or, my personal favorite, good old-fashioned elbow grease. When you are presenting your research, if you don't know what you're talking about, everyone else in the room will know you do not know.
2. Relax. Worry and stress are your enemies. If you're like me, you might hold the belief that anxiety is "the engine driving the train of your success." While this might be true when you are pulling an all-nighter and the alternative is spending the eight hours before test time checking your eyelids for light leaks, when you are doing a presentation it is a detractor. It's very hard to pay attention to a laser pointer that bobs around like a haystack in a hurricane.
3. Practice. "Practice does not make perfect. Perfect practice makes perfect." Vince Lombardi said that. He won Super Bowls. You do not have to win Super Bowls, but practice does help. How much is up to you (see below).
4. Know your audience. You don't want to stand up in front of the room and lecture for 20 minutes on yeast two hybrid screens because chances are fifty percent of the room have either done more yeast hybrids than you ever will, given a hundred lectures on yeast two hybrids, or invented yeast two hybrids. Of course, this is a slight exaggeration, but you see my point. Give us the good stuff. If yeast two hybrids are all you did, certainly talk about them, but also put them into context (like how you're trying to find a novel binding partner for the CF chloride channel by using yeast two hybrids).
5. Have fun.
6. Take some chances. Now is the time to learn and develop your style in a place where you won't be shot down for saying something a little off the wall. It might even come off great in which case you can remember this for the future.
7. LEARN FROM THE EXPERIENCE!! If you have a horrible presentation and you just feel awful, go and do something to completely forget the experience for a day or so. Maybe more depending upon how bad it was. Then go back to the

presentation and think about what happened. What did you do well? What did you not do so well? Take those things you did well, and keep them in your repertoire. Take the things you didn't do well, and burn them into your memory as things to avoid. This is by no means the last presentation you will ever do. Take the lessons you have learned and carry them forward. And remember: you will only get better at this.

Helpful hints:

- A. Memorize the first two or three sentences of whatever it is you are going to say. Once you hear your name, get out of your chair, and walk to the front of the room, you've done the hardest part of the presentation. You don't want to blow all of that hard work by freezing up. So, just know exactly how you're starting off. After you say the first two or three sentences, the rest is a breeze.
- B. I would say, make no more than 20 slides. The presentation you are going to make is to be somewhere in the neighborhood of fifteen minutes. There are usually three other students who present on the same day. Taking into account announcements for the program, faculty introductions, and set up, time is tight. Each slide you make is probably important and deserves its time on the screen. You don't want to be racing through 200 slides in fifteen minutes. You might have to serve Dramamine as an appetizer during the RIP dinner.
- C. When in doubt cut it out. Short and sweet is the key here. You want to take everything you have done during your rotations, boil it down, and present it in a way that everyone knows what you are talking about. It's a lot harder than it sounds.
- D. As far as the topic of practice is concerned, what I do is I take all of my data and arrange it in some sort of order. The more rotations you have, the more complicated it gets, but first order the data and understand it like the back of your hand. This usually takes me about 10 times going through it in my head and talking about it. Then, forget everything you have learned and focus on the introduction of your data. Make it simple and easy to understand, yet comprehensive and interesting (sounds easy, right?). Then, go straight from your intro to your data (that you haven't looked at recently). Can you understand the data at first glance based upon your intro? If you can, you've done your job. If not, tweak the intro. And be persistent. This comes naturally to very few people, but it does not mean with a little hard work, you can't be fantastic at it. Indeed, probably the best presenters never were "naturals."
- E. You don't have to have the best data in the world. People just want to see you've learned something. That's the whole point of this presentation when you get right down to it. If the best data you have is a gel that is slightly burned in the corner but illustrates a good point, show the slide. Remember the quality does not have to be publishable. Of course, it's great if you can get it there, but if not, don't fret.

Some "Guidelines" for giving MSTP Clinical Case Conference

By Mike Salerno, M.D., Ph.D.

- 1) Pick a clinical case that is particularly interesting to you. Perhaps it was a case that influenced your decision to pursue a particular career pathway, or perhaps you just found the case interesting on its own merits. It is probably easiest to do a case that you saw clinically, but it is not impossible to put together a good case presentation from reviewing the chart of a patient similar to one that you have seen (and medical records is open 24 hrs/day).

- 2) Plan to present your case in 25 minutes. It is probably best to present a single patient during this time as it will give you adequate time to present the H&P, discuss salient findings, develop a differential diagnosis, discuss the management of the case, and present some interesting facts about the medical condition that the patient had. You can also include any basic-science information about the case that you think is interesting.

- 3) Present the case the way you usually present and H&P for morning report
 1. CC
 2. HPI
 3. PMH, Meds, Allergies, SH, FH
 4. ROS if pertinent
 5. Initial labs and diagnostic studies (CXR,EKG,etc.)
 6. Assessment and Differential Diagnosis
 7. Actual Diagnosis, medical course, medical management, follow up etc.
 8. Discussion of the medical condition/pathophysiology

HOT SEAT RIP Guidelines

Rather than having in depth research presentations by a couple of students, the format of the hot seat sessions is to have a roundtable where selected individuals give a brief 4-6 minute synopsis of their ongoing research (first and second year students can talk about rotations of research done as undergraduates). We then open the floor for students to ask the student questions to clarify their understanding of the project. Following this period, The Director, Associate MSTP Director for Scientific Programs, and other invited faculty will quiz the students, not the presenter, on their understanding of the project. The intent is to get all students participating and asking those questions you had but did not have the courage to ask. The Discussion tends to be far ranging and the format encourages an in depth consideration of experimental methodologies, pros and cons thereof, and potential alternative experimental approaches. The goal is for each of you to gain experience in explaining your research quickly and succinctly to a diverse audience, and for everyone to become familiarized with the research interests of their fellow MSTP students. In addition, the format gives you immediate feedback on the effectiveness of your presentation, based on assessing the questions of your fellow students. For example, I forgot to state my major hypothesis, or I failed to explain the experimental design, rationale, etc. The goal is to

help you recognize how you might have done a better job at explaining what you are doing and why. We will strongly encourage your fellow students to ask you questions to help clarify your presentation since those not asking questions will likely be the target of subsequent questions asked by the faculty panel.

Here are some suggestions for you to think about in preparing what you are going to say.

1. Identify your audience and gear your presentation to the individuals in the group who know the least about your topic area. This is a critical skill for all effective communication including grant writing. Those more familiar will appreciate the refresher.
2. Identify who you are, what lab the work was done in, and perhaps a few words about your overall long term professional interests.
3. When you begin the summary of your work (this applies to any research communication), you need to always open with a sentence that convinces your audience that what you are about to say is important and worth their attention.
4. Give one or two sentences (you cannot afford much more than this given the short time limit) of background that orients the audience regarding your project and clearly identifies the problem, question, or hypothesis that you hope to address.
5. Tell them how you intend to address the problem/question/hypothesis and if possible the rationale for choosing the experimental approach you selected.
6. Tell them your major findings (if any so far).
7. Give a conclusion that summarizes your findings and what is next.

It is a real challenge to communicate in this fashion but is a skill you must develop to be a successful scientist.

Appendix E: Student Advice for Choosing a Mentor

Important considerations when choosing a research professor

*by Jay Purdy M.D., Ph.D. (who did so once too often)
with additions by later students*

1. **Area of research:** this is the most obvious of criteria. The short summaries in departmental literature give only a brief outline and can be used to narrow the field. The only realistic way to get an understanding is by talking to professors. Make a list and call for appointments. Five to ten is reasonable. This also gives you a chance to make judgments on the criteria mentioned below. Make sure that you are interested in the research actually going on in the lab. Some labs are willing to let you go off on a tangent, but this may mean the PhD takes a while longer. On the plus side, you may take more ownership in the project this way, end up with a bigger sense of accomplishment, and create a career path for yourself separate from your PhD mentor. Or the whole thing could fail, and you'll be able to fall back on a project that the lab has working.
2. **Personality of researcher:** As a student will be working with the professor for years, a good relationship is critical. This consideration is often overlooked, although I feel it is more important than #1. No matter how interesting the work, if you hate your professor, life will be hell in the lab.
 - a. *Accessibility.* Many professors are quite busy. Unless they are willing to make a significant effort, they will never have time to discuss problems with students. This risk is large in faculty with clinical responsibilities (they see patients). A large lab will have post-docs that can answer questions, however you should feel comfortable with this type of arrangement.
 - b. *Relationship.* Some people get along better than others. You must feel comfortable talking and asking questions of your professor
 - c. *Managerial style.* While related to the above, this is clearly a separate consideration. Professors range from those who want reports of each gel to those who won't talk to you for years (literally). Be sure your professor isn't too hands off or too hands on for your liking. Make sure your professor will give as much constructive criticism as you need.
 - d. *Temperament.* Professors can be thought of as kings and queens of their labs and some act like it. Some people are unaffected by being the focus of fits of rage, others are quite bothered.
 - e. *Environment.* Labs usually reflect the professor's tastes and vary greatly with cleanliness and order. While there is the aesthetic component to this question, many labs handle radioactivity and other biohazards that make mess, clutter and dirt risky. Find a lab with conditions that allow you to work comfortably. If you dislike working with animals, avoid it. Be up front with your mentor about whether or not you want an animal project.
3. **Choosing rotations:** After a full rotation through a lab, a professor's personality will be readily apparent. However, students get only three rotations out of the

hundreds of possible labs. Thus, it is important to make decisions based on the above before choosing their rotations. I suggest:

- a. *The initial interview.* Take the time to think about each of the above. If the professor cancels the appointment or cuts it short, it is likely that you will receive the same type of treatment as a student. Look around his/her office and lab and draw conclusions by what you see. Discuss how long a PhD would take. Be explicit in your expectation of how long a PhD should take.
 - b. *Older students.* This is a valuable resource often overlooked. Find out what other students think of possible professors. Believe what they say. If the word on the street is that this professor lacks funding, keeps grad students for ten years, or is incredibly busy with non-research activities, do not choose the lab.
 - c. *Students, lab techs in that lab.* Ask them for good points and bad points. Find out how long they have been there and how long it has taken past PhD students to get their degree in that lab. If the last PhD took 10 years, watch out.
 - d. *Post-docs.* Often times, post-docs will more your most valuable resource in a lab. It is important that they are available and willing to help, particularly with troubleshooting day-to-day difficulties.
- 4. Funding situation.** One of the most discouraging things that can happen is to have a professor move in the middle of your work. This is directly related to funding so ask point blank about their grant situation before making any permanent decisions (I'd even suggest before a rotation). Ask if they are happy here, if they are considering moving, etc. Ask other people about their funding situation. Ask them directly too (if you're shy, say 'My program director requires that I ask'). Oh, MSTP funds you for your first year of grad school. After that your mentor or training grants must fund you. So, make sure the PI knows this and that he/she has money for you and your reagents for the course of grad school.
- 5. Other lab personalities.** Surprising to me, a large percentage of labs contain personnel that dislike coworkers to the point of affecting the work generated. Situations of open lab warfare not only diminish the quality of data but make life miserable, even for innocent bystanders. Ask lab workers about conditions and about interpersonal lab relationships.
- 6. Know yourself:** The most important questions are those about yourself. If there was one question in particular that was supremely important, it is this: Do you enjoy working independently or do you enjoy a close mentorship with constant feedback? If you can answer that question accurately and can find a mentor who fits your learning style, you will have tremendous success.

Appendix F: 12 Things I Wished I Knew About Returning to Medical School but Didn't Know to Ask

Rich Pierce SMD'02

Note: This list is based entirely on my personal observations and opinions and is therefore far from complete and certainly open to addition, revision, modification, or use as a bird cage liner – however you see fit.

- 1. Allison Innes can be your greatest ally – make sure you stay on her good side.** Basically, the biggest pain in the neck about going back to 3rd Year of Med School is the scheduling, and Allison is where the buck stops on this issue. I found her to be very helpful in getting me the Clerkships I needed in the order and timing that I needed them. She was even kind enough to change the locations of my OB and Psych Rotations less than a month before I was supposed to start. The main thing is to be nice to her, keep your scheduling requests reasonable, and let her know about any changes you might need as far ahead as possible. Remember, as much as we'd all like to stay in or around C'ville for all our Rotations, everybody's required to spend a significant amount of time out of town. Although Gary's been trying to get us MD/PhDs more time close to home (for the purpose of potentially being able to attend interesting scientific conferences during our clinical years), be prepared to spend about 16 weeks out of town. If you really need to be in C'ville during a particular time period (say, around interview time), Allison is very flexible with helping you out – as long as you're willing to compromise and likely spend a different month away. One last thing here: Allison makes up the schedule for the coming year in February, so if you're pretty sure that you'll be starting back in the fall or winter, make sure you let her know as early as possible. By letting her know of your impending return before February, Allison can hold you a spot and start getting your desired Clerkship order in line.
- 2. Try to start back to the Clinical Clerkships as early in the school year as possible, i.e. July-September.** The main thing here is that you want as much potential free time during your 3rd/4th Year as possible. Getting back in September or October 2 years prior to your anticipated graduation year will give you 19 or 20 months to complete your required 13 months of Clerkships and any Electives you might want to do. The next logical time to start back is in January the year before you want to finally graduate, but this will leave you only 16 months for those same 14 required months, and 2 months of vacation winds up getting used up real quick. Of course, it's nearly impossible to predict early-on at what time of year you'll finish, but as things starts to wrap up, shooting for the summer 2 years before graduation will set you up pretty well to take a month off after your defense and still get back in plenty of time.
- 3. In the grand scheme of things, 6 week's time at the beginning of your research means a whole lot less than 6 weeks at the end.** Thus, I would

highly recommend doing one clinical Rotation in the summer after 2nd Year of Med School, as having one Rotation out of the way will really free you up time-wise later on. This is especially true should you not be able to return to the wards until January or February in the year before you want to graduate (see #2 above). In my opinion, the best Clerkship to do at this time is PSYCHIATRY (see explanation below in #4). Believe me, I would've loved to have had an extra 6 weeks for interviews, vacation or simply a really helpful Elective like ER or Radiology. Also, if your timing doesn't work quite as well as you'd like, that extra time will allow you to take that all-important month off between defending and starting back. Dean Pearson recommends this month and I agree that it's very helpful as a much-needed break. It's also important for doing things like wrapping up any papers you might be working on, printing out the final copies of your dissertation and bringing them for binding, and just getting your life back in order before the hours of 6 AM to 6 PM (at the least) are no longer yours.

- 4. Start back on a shorter Clerkship that requires a more limited scope of knowledge, such as Pediatrics or OB/Gyn.** The rationale here is that the Clerkship exam is a little easier to study for, and you get a short breather after just a few weeks. Also, if you have any idea of what field you might want to go into, you probably DON'T want to start back on that Clerkship since you're a little more likely to struggle as you return to the wards. Here are my thoughts on each of the Clerkships, although this should be tempered with your own feelings on what you might want to, or definitely don't want to, go into.
- a. Peds – really good to start back on, especially if you do it at UVA. 1 month on the ward allows plenty of time to work on H&P and patient presentation skills. 2 weeks of NBN and 2 weeks of clinic allow you ample time to study for the exam. Attendings, and especially resident are really nice, and probably more understanding than most others. Good attending teaching.
 - b. OB/Gyn – also good to start back on due to limited scope of knowledge. Did mine at UVA, where Gyn call is only until 11:00, and although OB call is O/N, you get to leave the next AM after rounds. You also get 2 weeks of nice 9-5 clinic. One drawback might be unfamiliarity with OR if you haven't yet done Surgery. Residents might not be quite as nice as Peds residents.
 - c. Family Medicine – maybe not as good to start back since you'll most likely be placed out of town, and the office setting requires a faster-paced, problem focused H&P. Early in your return to the Clinical Years you want lots of time to get back in the hang of doing thorough, detailed H&Ps and doing good presentations to attendings.
 - d. Surgery – not good to start back on due to potential shock of really long hours and a 12 week Rotation. Again, H&Ps tend to brief at a time that you need to be practicing working in detail. Probably helpful to have before OB/Gyn due to nice intro to the OR and suturing techniques. Attitude is very important here so you might want a little practice beforehand, but you also might consider doing this first if your absolutely sure you **won't** be going into Surgery. Also, if you do plan on going into this field, surgeons don't care if you do poorly in Psych, but you should have a good Medicine grade, and I'd recommend doing it before you do your Surgery Clerkship.

- e. Medicine – I would advise most strongly against doing medicine first due to the long duration (12 weeks) and the incredibly broad scope. It's also probably the most important Clerkship in terms of overall medical knowledge, so you want to have at least a little experience under your belt before taking it. Face it – you're gonna forget a lot of medicine during your years in the lab, and you want to start back on something with a little more restricted scope of knowledge.
- f. Psych – hopefully you've already done this right after second year, but if not, it's probably a good one to start back on for basically the same reason as OB/Gyn. The main reason I recommend doing Psych during your first summer (as opposed to OB) is because of its lack of emphasis on Step II of the Boards and its relative ease to learn again. The 3 fields most emphasized on the Boards are Medicine, Peds, and OB, so you'll want to do these Rotations relatively close to the time you take Boards so that the info is fresh.

5. Going to "Student Morning Report" for a couple of weeks is a great no-pressure way to get back in the swing of clinical medicine. Basically, this is a feature of the Internal Medicine Clerkship (run by Dr. Michael Rein) that occurs M-F, usually at 10:00 AM. The post-call students on the Rotation present patients they picked up overnight. The student will present the pertinent H&P findings, then the group will work through the differential with Dr. Rein, and finally, the labs, studies and any treatments will be discussed. It's a good way to hear how a patient should be presented and to re-familiarize yourself with pesky things like normal lab values and whole slew of pharmacopoeia. I found it particularly helpful to have my PDA, complete with ePocrates, handy, so that I could immediately look up any unfamiliar drugs. I'd recommend attending SMR for at least a week or 2 before you actually hit the wards. Just contact Dr. Rein a few days in advance to let him know that you'd like to sit in.

6. You probably DON'T need to do an AI in the field that you're planning on going into. However, you will need to work your ass off on the corresponding 3rd Year Clerkship. Obviously, if you really want to do something like Path or Radiology, you should schedule these Electives fairly early in the course of your 3rd Year. The main thing is that you need to get good recommendation letters from academic MDs within your field of choice. On the other hand, you also want letters from attendings with whom you've worked closely and who know you well. Although your PhD already identifies you as a rock solid scientist, but you also need testament to your ability as a clinician and at least a moderate commitment to clinical medicine. Remember, regardless of what residency you do, you **WILL** be an intern with a certain requirement for at least some degree of patient care. Thus, make sure you let your attendings know that you're interested in their field at the very beginning of the Clerkship and that you might even be asking them for a letter at the end. I think in this case it's also important to do this Rotation AT UVA, rather than some place like Roanoke or Salem. Namely, you'll have better exposure to well-known physicians and departmental chairs - Mike Thorner and Irv

Kron will be more influenced by the praise of UVA docs as opposed to those at an away site.

7. **Conversely, in case you haven't caught on, you DO want a letter from the departmental chair in the field you're going into.** Letters from these departmental chairs are important (even required if you're going into medicine), and a strong one will really help when it comes to interview time. Make sure you call the chair's secretary early and schedule an interview appointment some time around July or August of the year you'll be applying for the match. One last thing about Letters of Recommendation: unless you and your PhD advisor had a particularly bad relationship, you'll want to get a letter from him/her. He/she should know your skills and abilities better than any attending, and programs will want to know about these. Most programs allow you to send up to 4 letters and you should send the max number allowable to each program. Thus a good group of 4 letters would include one from the departmental chair, one from your PhD advisor, and 2 from well-known attendings in your field.

8. **The 2 most important months for interviews are December and January.** Thus, if at all possible, you'll really want some all-out vacation during those 8 weeks. You might also consider scheduling an Elective or mellow Rotation like Neurology during November, as some programs will offer early interviews that you'll want to take advantage of. Some programs do interview into February, but usually not much past the first week or 2, so some down time or another light Clerkship/Elective can help there. However, if you've had a full slate of interviews during Dec/Jan, chances are you'll be so sick of the travel and the cost, that you may decide to pass on Feb interviews. Lastly, if you really **can't** swing pure vacation time during those months, at least ask Allison Innes to schedule you so that you're **IN** Charlottesville during that time (see #1). This makes travel **much** easier in terms of packing and in the event that you have to drive to Dulles or Reagan National to get an affordable flight.

9. **April is another good month to have completely or partially off.** This is largely because you'll have already matched at the end of March and will likely want to start looking for a new place to live ASAP. Of course, if you decide to stay in Charlottesville for your residency (something I would NOT recommend), then this won't be much of a problem. However, starting life in a new city can be pretty daunting and time-consuming, and you may need to make more than one trip to take care of all your business. This is especially true if you're moving to a larger city (with a correspondingly-large housing market) and don't have any family or friends who know the area. Believe me, nothing is worse than having to squeeze in 2 or more short weekend trips to find a decent apartment. You'll likely already be reeling from the cost of interview travel, and minimizing the number of flights you have to take is a real help.

10. **If you've been keeping a moderately update CV/resume during Grad School, it will NOT take a long time to fill out your residency (ERAS) application.** If your resume is thorough (education, activities, leadership,

publications and presentations), all you wind up doing is transferring all this info into a different form – it takes a couple of hours, but is pretty mindless. The only thing you should need to spend any real time on is your Personal Statement. I won't go into specifics on this, but give yourself at least 2-3 days of solid work for writing and revising. My point here is that, although you probably don't want to be in the throes of your Surgical Clerkship during this time, you also don't need 2 week's vacation to deal with it. Lastly, UVA Student Affairs will give you a ridiculously early deadline for having all your stuff in to them. Although it's nice to shoot for this deadline, don't worry if you're a week or 2 behind – you'll still have **PLENTY** of time to get everything submitted to ERAS.

11. You probably need about 2 good weeks to study for Step II of the Boards, and you MUST have taken them no later than the last week of March in the year you plan to graduate. Certainly, taking them earlier can be helpful in the unlikely event that things don't go too well and you need to take them again. However, unless you're pretty damn confident that you'll ace it, I probably **would not** take step II early enough for your scores to be reported to your residency programs. They don't expect MD/PhDs to have finished them and most likely they'll only hurt you. Although you don't HAVE to wait to take them until after you've finished all your required Rotations, I'd highly recommend doing so. Having the clinical experience under your belt is really much more valuable than just reading some review book. In fact, if you can schedule OB, Medicine or Peds near the "end" of your "3rd Year", you could take Step II right after your last Rotation and possibly cut down on your study time for that subject. Again, the Psych on the Boards is very basic and much moiré easily re-learned than most of the other subjects. If you're in a bit of a time crunch and have to take Step II before completing all the required Clerkships, I'd choose Neurology earlier and leave Family Medicine until later – you really don't learn much in Family that will be terribly helpful on the exam.

12. Lastly, remember these 3 points:

- a. A bright, positive, and cooperative attitude really does go a long way. In **every** Clerkship, your performance on the wards is AT LEAST half your grade, and a good attitude will win you tons of points. Nobody will remember if you answer a pimp question wrong, but they will remember if you frequently leave early or seem uninterested.
- b. Make sure Dr. Rein knows where your Medicine Clerkship falls in relation to your other Rotations, especially if you're "behind" the rest of the people you're taking it with. The earlier Medicine comes in your Rotation order, the easier the grading.
- c. Having those 3 extra letters after your name is a **HUGE** bonus. First, although I wouldn't wear it on my shirtsleeve, it never hurts to casually mention that you've been out of clinical medicine for 3, 4, or 5 years. I've found that residents can be a bit more forgiving and may even be that much more impressed with what level of knowledge you do have. Second, when it comes to residency interview time, the PhD will only help you. Not only does it show drive, focus and perseverance, but pretty much any

interviewer worth his salt will ask about research. Your experience will dwarf that of roughly 90% of the other interviewees, so it's your time to shine!!

- d. Get your finances in order before graduation! This will make things much easier when you head off to residency, especially if you're looking to buy a place rather than rent. Also, if you've lived a little beyond your means and need a student loan to cover some expenses, make sure you apply for the loan while you're still in grad school. Because of your stipend and paid tuition, the Med School Financial Aid Office will say that you qualify for **NO MONEY**, however, the Graduate/Undergrad Financial Aid Office is much more forgiving and will generally float you a loan for a few thousand bucks. If you can manage with taking only a subsidized loan, that's definitely the way to go.

PART II – Rich's "Insider Tips" to student living in Charlottesville

1. Cheapest Gas in Town = Sam's Club (Rt. 29N). Not only are their "available to the public" prices pretty much the best in town, if you're a member, the \$0.05 per gallon discount is a total bonus.
2. Best Place to do your Banking = UVA Credit Union. After trying a couple of different banks, I like these guys because of their incredible lack of fees for low monthly balances. All you need is a \$5.00 minimum in a savings account and you never get charged a maintenance fee – a real bonus for those of us living on a shoestring. They offer all the nice usual services line online banking and direct deposit, and their branch right in the Hospital Parking Garage is really convenient when you need to run over quickly in the middle of the day. They also have an ATM in the main cafeteria if you run out of cash for lunch, and their deeply discounted tickets for amusement parks like King's Dominion and Busch Gardens are great.
3. Summer Fun #1 = Shakespeare at the Ruins (Barboursville, VA). A theater troupe called the Four County Players does this every summer, and it's well-worth the 40 min. drive up Rt. 20N to get there. Although they perform inside year-round, during the weekends in July and August you can picnic on the grounds, drink Barboursville wine, and watch FCP put on a great outdoor show using the ruins of Jefferson-era Virginia Governor James Barbour's home as the backdrop. They actually provide a "Medieval Buffet" for your dining pleasure (extra charge) or you can bring your own – just remember that Barboursville wine is the only EtOH allowed on the grounds, and again, you can either bring your own or buy some there.
4. Summer Fun #2 = Musicals at Ashlawn (Ashlawn-Highlands near Monticello). Similar to SF #1, but a bit more melodious. Traveling troupe performs both opera and more light-hearted musicals on Sat and Sun evenings throughout the summer. You've gotta bring your own picnic, but any kind of EtOH is allowed

for your drinking pleasure. Don't forget to tote a glass and a magnum of your favorite vino with you to your seat so that you can enjoy a few sips during the show itself.

5. Summer Fun #3 = Winery tours and Festivals. These events actually go on year-round, and some might argue that they're even better during the fall harvest. Either way, you want to pick up a Virginia Wine Passport, which not only gives a year-long calendar of events, but also descriptions of and directions to all the VA wineries. The "Passport" aspect comes into play in that, as you visit each winery, you get a sticker that goes in your passport – collect 10 or 20, and then mail your passport in for a special gift at the end of the year. Available at ANY of the wine shops in town.
6. Summer Fun #4 = Fridays after 5. Get that damn gel run and then grab some friends and head to the Downtown Mall Amphitheater. It's a great place to have a few beers (be sure to bring that ID!), hobnob with a nice mix townies and of non-underHoo University types, and laugh at those actually "brave" enough to get out on the dance floor and cut some rug. A different band plays every week, so you'll never hear the same thing twice. Also, the last "Fridays" is actually a Saturday in October known as the Blues and Brews Fest – tasty libations from microbreweries up and down the East Coast along with some cool jazz.
7. Summer Fun #5 = Tubing on the James (Scottsville, VA). Hopefully you've already experienced this sublime delight during your first week of Med School. If not, **DON'T** miss it this year, if you have, don't let it be the only time you go. This is a great thing to do whenever friends or family visit, or if you just have an idle Saturday when the heat and humidity are both in the triple digits. Of course, this usually involves drinking as well (yours truly traditionally kicks off the trip with a 40 of malt liquor – are you catching the "Summer Fun" theme here?), so just remember that **NO BOTTLES** are allowed on the river. Also, if you like jumping off the rocks from the half-way island, be sure to schedule your trip with James River Runners (<http://www.james-river-runners.com/jrr1.htm>), and NOT James River Reeling and Rafting, who put you in too far down the river. Some kind of shoes required – Texas recommended.
8. Flying To/From Charlottesville. The Charlottesville-Albemarle Airport (<http://www.gocho.com/>) is serviced by Delta, United and US Airways. Almost all outbound flights leave in the morning (usually early), so don't plan on departing in the afternoon – even if you can get a flight you'll probably pay through the nose. Also, while United and US Airways only offer prop plane service, Delta offers faster, quieter regional jets. If the ticket price is the same, go for the jet service.
9. Best Dining Advice = C'ville Bites. Forget the Yellow Pages and pick up a copy of this (I think) half-yearly free guide to Charlottesville Restaurants. Published

by the same press as the weekly newspaper "C'ville" and usually found near said distribution stands.

10. Bowling = Keglers. Hey it may be the only place in town, but it's really not too bad. Thursday nights are all-you-can-bowl for 1 price, and if I remember correctly, it's a pretty good deal. The scoring is fully automated, and after 10:00 the black lights are turned on to illuminate the funky décor and fluorescent bowling balls. They also have a full bar as well as their own microbrewery that makes pretty decent beer.

Feel free to contact me at any time with questions or if you'll be looking at doing a residency at Washington University in St. Louis. You can email me at rich.pierce@alumni.duke.edu or call my cell phone at (434) 825-2429. Good luck with everything!!

Rich

Guide to Clerkships and the Match Process

for University of Virginia MSTP students

A collaborative document initiated by Laura Adang '09, Brandon Kremer '09, Mark Hoofnagle '09, and Rooshin Dalal '09 and updated by UVA MSTP clerkship students

Important Websites

- UVA residency handbook
 - <http://www.med-ed.virginia.edu/handbook/residency/index.cfm>
 - Contains information, including Vital Signs Newsletter, which has the dates and to-do lists
- National Residency Matching Program (NRMP)
 - <http://www.nrmp.org/>
 - Needed for registration to the regular match, submission of your match list
- Electronic Residency Application Service (ERAS)
 - <http://www.aamc.org/audienceeras.htm>
 - Needed to prepare your electronic CV for residency applications
- San Francisco Match (SF Match)
 - www.sfmatch.org/
 - Needed for early match programs only (Child Neurology, Ophthalmology, Plastic Surgery)
- Instructions for letters of recommendation
 - <http://www.med-ed.virginia.edu/handbook/residency/vitalsigns/2009/feb-files/lettersOfRec.html>
- UVA Host housing program
 - <http://hoosonline.virginia.edu/site/c.ggLQI0OBKpF/b.3425571/>

Vocabulary

- "Clerkships" – required third year rotations. These include Medicine, Surgery, Pediatrics, OB/GYN, Family Medicine, Psychiatry, and

Neurology. Each of these is capped with a standardized, multiple choice, 100-question “shelf” exam on the last day of the clerkship.

- “Electives” – fourth year rotations in a field of your choice. These include inpatient, outpatient, and research experiences.
- “Selectives” – required electives that were created when curriculum reform shortened third year. They removed sub-specialty rotations from four of the required clerkships (Medicine, Surgery, Psychiatry, and OB/GYN) and put them in the fourth year. This allowed them to offer electives early in the fourth year, when you might want letters of recommendation and experience in a potential field.
- AI/ACE – Stands for “Acting Internship” and “Advanced Clinical Elective”, respectively. Your first ACE is designated as an AI; they are interchangeable terms. This is the only other required thing for fourth year. It’s a four week-long rotation in your field of interest where you supposedly act like the intern. It’s a good way to learn how much abuse interns get, as well as a chance to get good letters of recommendation.
- Fast track—Most schools offer special residency tracks for physician-scientists. These programs entail one less year of residency (mostly through a loss of elective time) and one year more of research at the end of your fellowship. Many programs also offer a guaranteed a fellowship position at your residency institution in the field of your choice.

Before You Return to Medical School

- Think about timing. As of 2009, third year starts at the end of April and goes until the end of February, divided into four-week blocks. Some rotations (Peds, Surgery, Medicine) are two contiguous four-week blocks. Going back as early as you can gives you the freedom to take other electives (if you want more experience in something or just don’t know what you want to do) as well as take time off for vacation, residency interviews, studying for boards, etc.
- Contact Allison Innes (first hallway on right in McKim, third door on the right) as soon as you think that you might be going back. She schedules all of your clerkships (your third year rotations) and is pretty important for fitting the fourth year schedule around those.

- Allison Innes advises that you schedule your dissertation defense 3-8 weeks before you return to clinics. Since your mentor is responsible for paying for you until the day that you return to clinics, you may want to schedule your defense just about 3-4 weeks before you return to clinics. That way you'll have time to do revisions and still have a short break before your first rotation.
- There is no return during December, and with new required rotations, you cannot return as late as January and still do an elective. This means that the latest you can return is November (there's one return per month). Most people who have been through it suggest returning in October at the latest, to build in a little breathing room.
- As soon as you get a return date, make sure to let the MSTP office and your BIMS Administrator know when it is so that they can initiate changing your funding from your mentor to the MSTP on the day you start clinics. You'll be on stipend when you return, so you'll be paid on the 5th of the month for the month to come.
- Contact Jill Clarke (first hallway on right in McKim, and first door on the right). She schedules your fourth year rotations, namely the electives and selectives. In addition, she's in charge of all of the paperwork that defines you as a medical student, so she'll get paperwork moving, which will be essential for everything.
- New ID - With Jill's paperwork in hand, go to the ID office by the cafeteria in the Old Hospital to get it updated with "Medical Student, Class of 20??"
- New photo – If desired, you can email John Jackson (jjackson@virginia.edu) with a new headshot, which will be to be mailed to your clerkship directors/residents before each third year rotation.
- MIS training – You will need a login, a password, as well as training; the training is sporadic. In order to get signed up for MIS, go to <https://www.healthsystem.virginia.edu/intranet/hscs-clinical-training/mistraininghome.cfm> to set it up. MIS handles the inpatient ordering and lab reports. Some of us had to redo training, others of us did not. It seems random. At least ask someone how to print patient lists and rounds reports. If you have already done training you can tell the people at MIS that you are a returning "MSTP Fellow"- they will think you are some sort of clinical fellow and reactivate your password no questions asked.
- Centricity/PACS setup – The hospital currently uses three separate

computer systems, run out of two separate offices. Centricity shows you outpatient orders, as well as all lab results, discharge summaries, consultant reports, clinic reports, etc. PACS is the radiology system that allows you to pull up X-Rays, CTs, MRIs, etc. You'll need all three to be a fully-functional med student. To get access to Centricity and PACS, call 924-5334 to get them to set you up with an account. Occasionally, they'll tell you that you don't exist in their system. If this is the case, you may need Jill Clarke to put your name in some database.

- Scrubs –Go to the '0' floor of the main hospital under the west elevators. You'll see linen services. Go up to the window and tell them you're a returning med student who needs his/her card activated to get scrubs out of the machine on the second floor.
- Pager – You will definitely need a pager during your clerkships and AI/ACE. There are two options – numeric, and alphanumeric. The alphanumeric ones cost a little more per year, but they are far more convenient (since the resident, attending, or nurse can type you a message instead of just paging you to call them back at a phone they've long since wandered away from). The easiest way to get a pager is to go to the VTec store on Cherry Avenue. It's in the shopping center next to the gas station at the corner of Cherry and 9th/10th (Roosevelt Brown parkway). They'll give you a pager that's associated with a phone number. Then, call the HOSPITAL operator from within the hospital and have them connect you to paging services. Jill Clarke will know your PIC, the 4-digit number that will be your pager number while you're here. Have paging services 'link' your PIC to the phone number of your pager. Some cell phone services can be linked to the PIC system if you can receive unlimited texts and do not mind them on your cell phone. Save a few bucks when you can.

Application Requirements to Participate in the Match

- Medical Student Performance Evaluation (MSPE) letter from Dean Pearson. For this appointment, you must have a CV, Biosketch, and a rough draft of your personal statement
- Personal Statement (1 single-spaced typed page). Can be tailored to different programs, as the statements are individually assigned to each place.
- Photographs. These need to be 3.5" x 2.5" and should have a light

backdrop so that they can be photocopied. There are many places you can go to get this done, but a convenient way is to go up to the third floor of McKim and have the Media Services folks (semi-professional setup) take your picture. They charge about \$16 and provide you with 8-9 pictures on a letter size sheet, and are usually available in a day or two. Kmart costs only \$10, but takes several weeks. These will be used by the schools to identify you when you come to interview and during the final selection process, so make sure it looks like you.

- Recommendation Letters (3-4). The 4th letter should be from your research PI, but only use this one if an optional 4th letter spot is available for the school. Always check on the number of letters requested from each school—it will vary from 2-4+. At least one letter needs to be from a physician in your specialty of interest. Again, the letters are individually assigned to each program, so they can be somewhat tailored. It is not a bad idea to get one letter from a medicine attending, regardless of your area of interest. The schedule of attendings for medicine is available on the internal medicine site. If you want to work with someone specific or someone from a specific department, check the schedule, choose your clerkship dates to coincide, and then email the medicine clerkship secretary to make sure you get put on that team.
- You may also need a letter from the head of your clinical department (check each school's residency website, as provided by ERAS, for requirements). Medicine will contact your class over the summer to arrange for this letter to be written following a meeting between you and a senior department representative (Dr. Amy Tucker in 2008). For pediatrics, the letter is rarely required (UCSF, Stanford, Wash U, and Duke wanted it last year) and typically written by Dr. Wilson.
- ERAS registration and application. This is a comprehensive online CV program. It takes a long time to complete, so start working on it as soon as you can.
- NRMP registration in the summer to submit your list in February.

General Tips

- Do everything as early as possible: submitting your application, obtaining letters, and responding to interview invitations.

- Although there is some flexibility, and you can apply to more than one type of program (i.e. both IM and Peds), you should decide your career path by May-June of your fourth year. Program directors do speak with one another.
- Ask attendings as soon as you have finished working with them for letters. Can they give you a “strong letter of recommendation”? Remind them in June-July with an email containing the LOR instruction sheet from the UVA handbook’s site (see above), your CV, and your personal statement.
- Meet with your faculty advisor early in August to have him/her review your application, give you an estimate of how competitive you are, how many programs to apply to, and which specific programs you should consider given your preferences.
- Many of the top tier programs only interview in December-January, so don’t fill up these dates with more flexible programs if you can.
- Most people that match have 7 programs on their list. For the more competitive fields (Derm, Ortho, ENT, Plastics, Rad Onc), people that match have 14 programs on their list. Most people that do not match have significantly fewer programs listed. You will not like everywhere, therefore interviewing at a slightly larger number of schools is necessary.
- Consider bringing reprints of your papers to your interviews—questions about your PhD will likely constitute a major portion of your interviews.
- Consider making a sheet or portfolio of your outside interests if possible (woodworking, pottery).
- Submit your ERAS application within 5 days after the season opens (around September 3rd).
- Try to get all your LOR writers to send in their letters by mid-August so that they can all be ready once your application is sent out during the first week of September. Many programs do not send out interview offers until your application is complete.
- Consider bringing a copy of your ERAS application to your interviews so

you can refresh your memory about what you wrote (and in case they can't find your application!).

- Respond to interview offers within 24 hours (4 hours if possible) because interview spots fill up quickly. Programs routinely send out more interview offers than they have interview spots. Save spots though for your top schools, because those may respond last.
- Schools are very good about allowing you to coordinate your visits (i.e. clustering everything on the West coast into one trip).
- Try to arrange your rotation schedule so that you can take vacation (or easy electives) during December and January. This will make interview planning and travel much easier.
- If you did well on Step 1, consider waiting to take Step 2 CK until after January.
- Before each interview, prepare answers to the following questions since you will be asked most if not all of them:
 - Why are you applying in {insert specialty here}?
 - Why are you applying to our program in particular?
 - I noticed you did poorly in {insert clerkship, course, or USMLE here}. What happened?
 - How will your PhD training help you (in your specialty or career)?
 - How do you plan to balance research with clinical responsibilities?
 - Where do you see yourself in 5/10/20 years?
 - Tell me about a patient that you saw on the wards.
 - Variations include, tell me about your most difficult/best patient interaction.
 - What questions do you have for me?
 - You will be asked this many times, sometimes by the same interviewer. Have several backups on hand just in case.
- Thank you notes. There is no rule about this, but since everyone else sends them, you should also. Send one to each person that interviewed you as well as others who took an effort to answer questions for you, show you around, etc. Do this within 1-2 days so that the interview day is still fresh in your mind.
- It is a good idea to have a rotation in your area of interest immediately

before you go to interview. This way the topic, new developments/research, and the patients are fresh in your mind.

- Almost everyone wears a dark suit to their interviews. Wear comfortable shoes—you will have to tour every hospital and grounds that you visit.

Timeline to Graduation

(dates subject to change, see provided websites for updates)

- **April**
 - Receive AAMC ID at class meeting for residencies (if still distributed)
- **May**
 - Beginning of MSPE appointments with Dean Pearson
- **June**
 - Obtain professional photographs (3.5"x2.5") to be submitted with your applications (Kmart cost ~\$10 and took 2 weeks)
 - Register for the early match at the SF Match site, if applicable (\$100)
 - For early match only, you will also need an official UVA and undergraduate institution transcripts
- **August**
 - End of MSPE appointments with Dean Pearson
 - Register online with the NRMP (~\$40; \$55 if in couple's match) and ERAS (\$60 for 10 programs, \$8 per additional school from 11-20, then \$15 each) websites using AAMC ID/ERAS token
 - Application is due to SF match for early match only (\$60 for 10 programs, \$10 each for 11-20, \$15 each for 21-30)
 - Select the schools to which you will apply
- **September**
 - Deadline for submission of ERAS application in mid-September
 - Letters due to Ginny Atwell (Student Affairs) by mid-September
 - MSPE letters will be available for review
 - Depending on your specialty, offers may immediately begin to come in
 - Early Match address labels and form due to Student Affairs

- **October**
 - Beginning of interview season for Early Match

- **November**
 - MSPE letters are released to the schools. Some schools (Brigham and Women's and MGH Internal Medicine wait for this letter before sending out interview offers)
 - Beginning of interview season for NRMP Match

- **December**
 - Many of the top tier programs interview primarily in this month

- **January**
 - Early Match List due
 - Early Match List results released
 - Most programs stop interviewing in January

- **February**
 - NRMP Match List due

- **March**
 - NRMP Match results released on Match Day in mid-March
 - Get your required PPD done at Student Health