

Biotechnology Training Program

University of Virginia

PROGRAM HANDBOOK

BTP is open to all UVa doctoral students enrolled in basic science degree programs, including students whose mentor may not currently be affiliated with the training program.

APPOINTMENT TO BTP

- **Application/nomination.** Doctoral students enrolled in basic science degree programs in the School of Medicine, Graduate School of Arts and Sciences and School of Engineering and Applied Science are eligible for nomination or may self-apply to the Biotechnology Training Program in late April or early May.
 - BTP application/nomination form
 - BIMS training grant nomination form
 - Recommendation/nomination letters (2-3)
 - Current, unofficial copy of undergraduate transcripts
 - Copy of GRE scores

- **Minor Mentor.** Trainees must select a minor mentor within the first 6 weeks of appointment. If your major mentor is in the School of Engineering or Department of Chemistry, select a minor mentor from participating BTP mentors in the School of Medicine, or vice versa (see BTP web site for mentor list). Discuss this decision with your major mentor, and make sure that all parties are in agreement. Minor mentors will optimally serve on the thesis committee, have an interview with you annually and provide advice on the selection of minor courses. Such cross-disciplinary supervision greatly enhances the training experience and can open entirely novel avenues of scientific discovery and innovation.

- **Externship.** Initiate plans for a 1 - 3 month company externship to be completed after your first, but before the end of your second year appointed to the BTP. You and your major (dissertation) mentor are required to sign the note of intent form and return within 4 weeks of receiving the formal BTP appointment letter. Please include the name of your selected minor mentor.

- **Course requirements.**
 - **Research Ethics.** Each BTP trainee must enroll in the Research Ethics course (BIMS 710/BIMS 7100)
 - http://www.healthsystem.virginia.edu/internet/gpo/research_ethics/).
 - **BTP Course Requirements.**
 - Biochemical Engineering** (CHE 647/CHE 6447) and
 - Cell Structure and Function* (BIMS 512/BIMS 5012) or
 - Biological Chemistry* (CHEM 743/744 / CHEM 7430/7440); plus
 - One additional course from the recommended Biotechnology Training Program course list. For trainees housed in Engineering/Chemistry, this additional course must be selected from the 'Biology' list of choices. All trainees must also complete degree/program course requirements.

RECOMMENDED BTP COURSES

(** is required; *chose one of two)

Biology Options

CELL BIOLOGY/PHYSIOLOGY

- Cell Structure and Function - BIMS 512/BIMS 5012*
- Developmental Biology - BIOL 508 / BIMS 508 / CELL 8559
- Physiology - BIOM 603, 604
- Cell Mechanics, Adhesion and Locomotion - BIOM 891
- Wound Prevention and Repair - BIOM 892

GENETICS/MOLECULAR BIOLOGY

- Gene Structure, Expression & Regulation - NUCR 811/MICRO 811
- General and Molecular Genetics - BIOL 805
- Molecular Genetics of Prokaryotes - MICR 808
- Molecular Pathogenesis - MICR 810
- Molecular Basis of Cancer - MICR 815
- Genetic Engineering BIOM - 892

BIOCHEMISTRY/IMMUNOLOGY

- Biological Chemistry - CHEM 442*
- Biological Chemistry - CHEM 743/744
- Biological Chemistry - BIOC 503/504
- Fundamental Immunology - MICR 803
- Pharmacology - PHAR 630
- Biophysics/Biochemistry - BIOC 701, 702
- Biophysical Chemistry - BIOC 703, 704

Engineering/Chemistry Options

CHEMISTRY

- Biochemical Engineering - CHE 647**
- Advanced Thermodynamics - CHE 615
- Biomolecular Engineering - CHE 882
- Chemical Reaction Engineering - CHE 618
- Enzyme Reaction Mechanisms - CHEM 845

ENGINEERING

- Transport Processes - CHE 625
- Mass Transfer - CHE 630
- Fundamentals of Biophysical Science I, II – BIOM 701,702
- Quantitative Techniques in Biomedical Engineering – BIOM 731
- Medical Image Analysis – BIOM 784

- Biomechanics – BIOM 822
- Semiconductor Materials and Devices - EE667
- Multi-Dimensional and Array Signal Processing - EE776
- Continuum Mechanics with Applications – AM 602
- Fluid Mechanics I, II – AM 631, 632
- Theory of Elasticity – AM 612
- Inelastic Solid Mechanics – APMA 708
- Micromechanics of Heterogenous Media – APMA 746
- Introduction to Biomaterials - MSE 512

COMPUTATIONAL/INSTRUMENTAL METHODS

- Techniques for Chemical Engineering Analysis and Design - CHE 665
 - Instrumental Methods of Analysis - CHEM 551
 - Instrumentation and Measurement in Medicine - BIOM 610, 611
 - Numerical Methods – APMA 513
 - Applied Finite Element Analysis – AM 671
 - Computational Fluid Mechanics – APMA 672
 - Statistics for Engineers and Scientists – APMA 643
 - Numerical Solution of Partial Differential Equations – APMA 734
- **BTP Journal Club.** You are required to attend and participate in all monthly BTP Journal Club seminars. BTP Journal series that will run through the academic year beginning in September. You will present research results, or a related *Nature Biotechnology* article, on a round robin basis. Sign-up for presentations is in September.
 - Attend all **BTP seminars.**
 - Attend and present a poster at **BTP Symposia.** BTP Symposia are held every other year in the Spring, and comprise students, mentors, company representatives, members of the Board of Advisors and nationally recognized invited speakers. Our first Symposium was held in April '02 at the Omni on 'Connecting Cell Behaviors to Manufactured Therapeutics', and our second in May '04 on 'Real-World Systems Biology. Designing Better Drugs and Improving Tissue Function'. The most recent Symposium (April '06) was on 'Systems Biology: Linking Molecules in Networks to Cells in Tissues'.
 - Prepare and submit **annual progress reports** by April 27th. This is one week before the May 4th new student application deadline. Blank versions of this and other forms are on the BTP web site. On-time submission is required to be eligible for second year funding (first year BTP'er's), and conference funding (all BTP'er's).
 - Finally, complete your dissertation proposal and/or comprehensive exam departmental requirements, meet at least once a year with your thesis committee and complete your

dissertation. We have high expectations for the quality of research. Your dissertation should constitute an original and significant contribution to the field at a level acceptable for publication in a peer reviewed scientific journal of high quality.

THE EXTERNSHIP

Newly accepted BTPers's should initiate plans for a 1 - 3 month company externship to be completed within their first two years in the BTP. This timing allows the BTP to support you from NIH training grant funds. Stepping into the daily life of corporate labs will be highly motivating and educational, and is a requirement of the BTP. We require you and your major mentor to sign the accompanying note of intent form and return within five weeks of receiving this acceptance letter. Please include on this form the name of your selected minor mentor.

Please report on your externship on the *Student Externship Form* (downloadable from the BTP website) and give a brief oral presentation (5 min) during the Fall welcome dinner. The company host will forward a one paragraph evaluation form also on the website of the student's participation in the laboratory rotation to the program Graduate Advisor, who will approve credit for the rotation. The forms will be kept on file in the Graduate Programs Office.

The externship is organized as a credit course. It is open to non-BTP PhD students but no support can be provided.

BIMS 821 Biotech Industrial Externship

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BIMS 822 Biotech Industrial Externship

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EXTERNSHIP SUPPORT

- While on your required externship, your BTP stipend continues uninterrupted. Often companies wish to put BTP students temporarily on their payroll. If the amount provided is equal or greater than your BTP stipend, it is NIH policy that your BTP stipend ceases for this period. No double payment is allowed. If partial support is provided, your BTP stipend must decrease by an equivalent amount. We encourage companies to help out with salary, travel and/or housing.
- The BTP provides for travel costs to externships as a refund, or if a plane ticket is involved, let Mary Hall book the ticket so that you do not incur any costs. All travel must be economy class.
- The BTP also refunds costs for economical housing while on your externship, however if a company offers to provide housing this should be encouraged. Please check first with Gordon Laurie before committing to housing. Least expensive, but requiring advance organization, are small furnished apartments in someone's residence. Generally, we hope to keep housing costs at or less than \$600 per month.

- Please take pictures of your externship when allowed (i.e. outside and environ shots) to include in the BTP newsletter and for a presentation to other BTPers upon your return.
- We require you to complete your externship within the first two years of entering the BTP. This ensures that we can reimburse you from our NIH TG funds.

STIPEND, TUITION AND HEALTH INSURANCE

- New BTPer's are provided with full stipend, tuition and health insurance support for a maximum of 2 years. Second year support is dependent on on-time (April 27th) submission of your year 1 progress report and demonstration of adequate progress.
- After 2 years of BTP support you remain a full BTP member as your major mentor takes over stipend, health insurance and tuition costs. The stipend remains at the same level (as set for the Biomedical Sciences at UVa). Health insurance and (research-only) tuition costs also must remain at the same level. Note that the health insurance expense is an obligation incurred equally by all Biotechnology Training Program students' mentors. This is true regardless of whether their own departmental PhD students are covered by health insurance. Stipend and tuition portions of the obligation are reduced for mentors of students who win external fellowships, or who compete successfully for internal (Presidential) fellowships.
- BTP mentors not confident of their ability to provide all three components of the requisite support (stipend, tuition, health insurance) after year two should inform Gordon Laurie.

A willingness to comply with this policy is expected from all BTP mentors.

Student Support 2009 – 2010

		VA	Non-VA
Stipend (Base rate)		\$25,000	\$25,000
<i>TG covers \$20,976; Mentor supplements \$4,024</i>			
Tuition & Fees	Summer	\$1,251	\$1,263
	Fall	\$1,693 – 6,319*	\$1,693 – 11,319*
	Spring	\$1,693 – 6,319*	\$1,693 – 11,319*
Health Insurance			\$2,092
Dental Insurance (Reimbursement)			\$321
Total Funding:		\$32,050 – 41,302	\$32,062 – 51,314

*Tuition & fees vary according to credit hours, VA residency, and school of enrollment (i.e., SEAS or GSAS)

TRAVEL

- Presenting posters and talks at scientific meetings is a key component of BTP training. If you wished to be partially reimbursed for travel to a meeting in which you are presenting, please contact Gordon Laurie in advance. BTP policy is \$450 per student per year in meeting travel support. You must be a presenter (and have submitted the previous year's Progress Report on time). Support is by reimbursement.
- At least two weeks prior to traveling, please visit the Graduate Programs Office to complete a travel pre-approval sheet and obtain a travel envelope to store travel-related receipts, i.e. registration, airline boarding passes, and meal receipts.
- **NOTE:** When you travel, you must retain your boarding passes to process their travel reimbursements. All requests for reimbursements that don't have boarding pass accompanying them WILL NOT be processed.

COMMITTEES & BOARDS

- I. The **BTP Executive Committee** consists of the BTP Director and selected BTP faculty. BTP faculty will be appointed by the Director of the BTP.
 - **Function:** to serve as the BTP admissions committee and to review the scholastic and research performance of BTP trainees in May of each year. The executive committee reviews and accepts or denies faculty who wish to join the BTP. Faculty wishing to join the BTP should send their NIH biosketch with funding information and a statement of interest to Gordon Laurie. Federal research funding is a prerequisite for joining the BTP. Senior faculty may be accepted without federal funding by alignment with an established BTP faculty mentor.

- II. **The Board of Corporate Advisors** consists of selected corporate and academic leaders of the Biotechnology community. The Board is appointed by the Executive Committee of the Biotechnology Training Program.
 - **Function:** to educate BTP trainees about the employment in industrial biotechnology – both pro’s and con’s – and where appropriate serve as student advocates.

- III. An individual **Thesis Proposal and Research Committee** will be formed when the student has chosen a dissertation advisor. The dissertation advisor or ‘major mentor’ becomes the committee chair. The committee is optimally composed of at least two other BTP faculty members and includes the trainee’s minor mentor. Additional University faculty members may be included. The committee will meet at least once a year. It will direct the student’s academic and research program throughout his/her graduate career. This committee will meet with the student to give its advice and consent for entry into the writing phase of the dissertation.
 - **Function:** to evaluate and guide the student’s ability to formulate a research problem and conduct research in the BTP.

- IV. An individual **Dissertation Defense Committee** will be composed of the Proposal and Research Committee plus as many as two additional members. Optimally, at least three committee members should be faculty members associated with the Biotechnology Training Program. The University requires that the thesis examining committee, with the advisory professor as chair, consist of no fewer than four members of the GSAS faculty, one of whom must be from another department and serves as a representative of the Graduate Committee. (The GSAS faculty are those faculty who are tenured or tenure-track).
 - **Function:** to provide the final evaluation of the student’s dissertation work, including oral and written performance.

THE PHD: SCHOOL OF ARTS & SCIENCES AND THE SCHOOL OF ENGINEERING & APPLIED SCIENCES

The GSAS requirements for the Ph.D. degree are completion of a minimum of 72 hours of graduate course work; at least 54 of these hours must be in courses other than non-topical research. Students should complete 54 hours in course work and topical research by the end of the second year. After second year, registration should be primarily for non-topical research only. Students entering with a MS degree are granted 24 hours of graduate credit for their previous work. Students entering from Medical School (MSTP) are granted 18 hours of graduate credit from Medical School Courses. All BTP students are required to attend all BTP Journal Club sessions and seminars. BTP students remain members of the BTP until they graduate.

1. Advancement to Candidacy for the Ph.D. Degree – Research Proposal and Oral Examination

- The student will prepare a research proposal and defend it before his or her Proposal and Research 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.
- **Function:** to review the student's ability to formulate a research problem and to design a research program aimed at elucidation of the problem.
- **Format:** The basic elements of a formal NIH grant proposal should be present. These include Specific Aims; Background and Significance; Preliminary Results; Experimental Design and Methods; and Literature Citations. Unlike most grant proposals there is no requirement for preliminary results or supporting data, although very useful if available. The proposal must describe research that is new and untested.
- **Timing: Must be completed by the end of the second year in residence.**

2. Annual Progress Reports and Mentor Evaluation

- **Students** submit an Annual Progress Report for review by the BTP Executive Committee. The deadline is April 27th of each year, one week before the new student application deadline. As noted earlier, renewed second year support (first years) and conference support (all BTPers) is dependent on on-time submissions. Reports are expected from all BTPers even if you have cycled off of BTP support. Gordon Laurie meets individually with all BTP students in May-July to pass on comments from the Executive Committee. This and other BTP forms are available at the BTP website.

3. Dissertation and Defense

- The **dissertation**, presented in partial fulfillment of the requirements for the Ph.D. degree 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. At least one peer-reviewed publication first-authored by the candidate must have been accepted prior to the defense of the dissertation. The dissertation

must be authored by the candidate and contain the primary data obtained in the dissertation research. The role of the dissertation advisor will be that of an editor, but not author. Although the document may contain published information, such information should be carefully integrated into the main body of the dissertation. The work of others should be clearly delineated and acknowledged. In all cases the dissertation must include suitable introduction and conclusion sections to unify its contents. In addition, the dissertation must adhere to the criteria set forth by the Graduate School of Arts and Sciences or School of Engineering and Applied Sciences.

- The **defense** of the dissertation will occur approximately **2 weeks** after a copy of the dissertation has been provided to the Dissertation Defense Committee. The scientific contents of this dissertation should be familiar to the committee members, so that it will not be rejectable on research grounds at this juncture. Matters of style, etc., should be gone over in rough drafts by the committee before the final typing. These guidelines shall not limit the actions of the examining committee which may, at its discretion, require a rough draft earlier and may schedule a preliminary examination prior to the actual defense.
- 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. Finally, complete your dissertation proposal and/or comprehensive exam along with other departmental requirements. Meet at least once a year with your thesis committee and complete your dissertation. We have high expectations for the quality of research. Your dissertation should constitute an original and significant contribution to the field at a level acceptable for publication in a peer reviewed scientific journal of high quality.

*note that many of these forms require either the Adobe Acrobat Reader or Microsoft Excel. If you do not have the required software, please contact your BIMS Program Administrator for paper copies.

ACADEMIC FORMS

- Ph.D. Degree and BIMS Program Declaration Form
- Ph.D. Degree and BIMS Program Declaration Guidelines
- Annual Evaluation of Progress
- Mentorship Evaluation Form
- Ph.D. Program Annual Student Progress Report
- Program Defense Evaluation Form
- Concentration Codes - Instructions
- Rotation Report

STUDENT REIMBURSEMENT AND FISCAL FORMS

- Reimbursement Policy-please read this first
- Payment Request Form (a.k.a.Student Reimbursement Form)

- Pre-Approval Form for Travel
- Student Travel Expense Worksheet
- Proof of Payment
- Healthcare Reimbursements

PHD MENTORSHIP REQUIREMENTS

- In order to act as a mentor in the Biotechnology Training Program faculty belong to the Graduate School of Arts and Sciences (GSAS) Faculty or to the Graduate Faculty of the School of Engineering [and Applied Science](#).
- Faculty who are not GSAS Faculty or the Graduate Faculty of the School of Engineering can, however, be members of the Biotechnology Training Program. Persons in this category will most likely have tenure or tenure track appointments in a Clinical Department in the School of Medicine, or term/temporary appointments as Research or Visiting Faculty.
- Federally funded faculty with tenure or tenure track appointments and membership in GSAS or GFSE are encouraged to request membership as a BTP mentor. Please send your NIH biosketch, funding information and reason of interest to Gordon Laurie (glaurie@virginia.edu). Students in non-BTP mentor labs are welcome to apply for BTP funding. If accepted, the supervisor becomes a BTP mentor. New mentors not yet federally funded will be linked with a more senior BTP mentor.

BTP TRAINEE ROSTER 2009 - 2010

Name of Trainee	Mentor(s)
Awojoodu, Anthony	Botchwey
Bailey, Aaron O	Hunt
Baras, Alexander S	Moskaluk
Bonthius, Paul J	Rissman
Deitcher, Robert	Fernandez
Hedin, Annika	Lawrence
Johnson, Sarah E	Hudson
Kennedy, Perry	Lynch
Kilroy, Joe	Hossack
Leslie, Daniel C	Landers
Little, Kristina M	Ley
Merk, Barbara	Hussaini
Neal, Rebekah A.	Botchwey
Oberhardt, Matthew A	Papin
Oh, Kyudam	Kwon
Perez-Almodovar, Ernie	Carta
Stadniski, Michael D	Brown
Wang, Meng	Ford
Watson, Tanya Tanassa	Geysen
Welch, Cullan	Concannon
Yang, Jason	Saucerman

BTP PARTICIPATING FACULTY

Name	Department	Telephone	Email
Gary Balian	O, BMBG	924-2615/5181	gb
Travis Blalock	EE	924-1331/3690	tnb2a
Edward Botchwey	BME	243-9846	eab6e
David Brautigan	MII	924-8504/5892	db8g
Michael Brown	INMD, MII	924-5106/243-9560	mgb4n
Giorgio Carta	CE	924-6281	gc
Linda Columbus	C	243-2123	lc4zs
Patrick Concannon	BMBG	982-3288	pjc6n
Zygmunt Derewenda	MPBP	243-6482/982-3151	zsd4n
Douglas DeSimone	CB	924-2172/1881	desimone
Victor Englehard	MII	924-2423/1706	vhe
Erik Fernandez	CE	924-1351	erik
Roseanne Ford	CE	982-6283	rmf3f
Jay Fox	MII	924-0050/2356	jwf8x
Cassandra Fraser	C	924-7998/6992	cf4n
H. Mario Geysen	C	243-7741/5539	hmg6j
Stephanie Guerlain	SE	924-4438	sag3c
William Guilford	BME	243-2740/924-9908	guilford
Brian Helmke	BME	924-1726/243-9699	bph6n
John Herr	CB	924-2007	jch7k
Jeffrey Holmes	BME	243-6321/982-3870	jwh2t
Rick Horwitz	CB	243-6813/6812	horwitz
John Hudson	CE	924-6275/982-2658	jlh8e
Donald Hunt	C, P	924-3610	dfh
Isa Hussaini	P, NS	924-0110/9189	imh5c
Inchan Kwon	CE	243-1822/982-2658	ik4t
James Landers	C, P	924-8658	jpl5e
Deborah Lannigan	MII	924-1144/924-1152	dal5f
Gordon Laurie*	CB, Director	924-5250/2595	gwl6s
Michael Lawrence	BME	982-4269	mb12a
Xiaowei Lu	CB	982-6528/982-6526	xl6f
Kevin Lynch	PHAR, BMBG	924-2840/982-3878	krl2z
Timothy MacDonald	C	924-7718	t1m
Christopher Moskaluk	P	982-4408/0990	cam5p
Pamela Norris	MANE	924-6295	pnm3d
Jason Papin	BME	924-8195	jap8r
J. Thomas Parsons	MII	924-5395/1948	jtp
William Pearson	BMBG	924-2818	wrp
Shayn Peirce-Cottler	BME	243-5795	smp6p
William Petri, Jr.	INMD, MII	924-5621/924-0075	wap3g
Prabhakara Reddi	PATH	982-0007/924-2151	ppr5s

Prabhakara			
Emilie Rissman	BMBG, INMD	982-5611/982-4742	efr2f
Michele Sale	INMD, CV, BMBG	982-0368	ms5fe
Martin Schwartz	MII	243-4813	mas5bm
Thomas Skalak	BME	924-0270	tcs4z
Ann Sutherland	CB	243-6711	as9n
Ronald Taylor	BMBG	924-2664	rpt
Barbara Venton	C	243-2132/924-3170	bjf2n
Jun J. Zhu	PHAR, NESC	243-9246/982-3878	jjz4n

EXECUTIVE COMMITTEE

Name	Position	Department
Gordon Laurie	Assoc. Prof. & BTP Director	Cell Biology
Zygmunt Derewenda	Professor	Molecular Physiology & Biological Physics
Erik Fernandez	Professor	Chemical Engineering
James Landers	Professor	Chemistry
Thomas Skalak	Professor & Chair	Biomedical Engineering

CORPORATE BOARD OF ADVISORS

Name	Post	Department
Robert McKown	Professor of Integrated Science & Technology; Director of the Biomanufacturing Lab	James Madison University mckownrl@jmu.edu
George Martin	Former NIA Scientific Director; Former Chief Technical Officer & Senior VP at Fibrogen	gmartin@nidcr.nih.gov
Jay Reuben	Director, R&D	Becton Dickinson Diagnostic Systems
David Patteson	President & CEO	Advion Biosciences pattesod@advion.com
Timothy Redden	Associate Dean for Development and VP of UVA Engineering Foundation	ttr2n@virginia.edu
Alan Simpson	VP of Operations	PRA International Former Clinical Operations Mgr. Novartis
Michael Stern	VP-Inflammation Research Program, Allergan Inc.	