

RUTGERS Biotechnology Training Program



Academic Positions

Topics in Advanced Biotechnology I
September 5, 2014

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Fall 2014
16:125:603 Topics in Advanced Biotechnology
Fridays, 9:30-11:30, BME Room 122

DATE	TOPIC	GUEST SPEAKER	Trainee Presenter	Trainee Presenter
September 5	Academic Positions	Martin Yarmush	Kathryn Drzewiecki	Ilija Melentijevic
September 19	Individual Development Plan	Ann Stock	Daniel Browe	Brittany Taylor
October 3	Statistics	Ramsey Foty	Jose James	Narendra Kuber
October 17	Overcoming the Academic Hurdle	Jillian Whidby	Corina White	Dharm Patel
October 31	Industry/Patents	TBA	Trevan Locke	Sal Ghodbane
November 14	Ethics	Troy Shinbrot	Ileana Marrero Berrios	William Pfaff

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Outline

- Course Requirements
- Renewal Grant Review
- Getting an Academic Position

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Course Requirements

Subject	Credit Hours
Molecular and Cellular Biology	3
Biophysical or Biointerfacial Chemistry	3
Bioengineering or Quantitative Science	3
Ethical Scientific Conduct	1
Required Courses in Graduate Discipline	0-12
Bioengineering in the Biotech & Pharmaceutical Industries	3
Innovation and Entrepreneurship for Science & Technology	3
Topics in Advanced Biotechnology I and II	10
Laboratory and Industrial Rotations	0-2
Graduate Research	39-48
Total Credit Hours (Minimum)	72

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Course Requirements

Subject	Credit Hours
Molecular and Cellular Biology	3
Biophysical or Biointerfacial Chemistry	3
Bioengineering or Quantitative Science	3
Ethical Scientific Conduct	1

16:160:537: Biophysical Chemistry I: Biomolecular Structure And Function
 16:160:580: Structural Biology, Structural Biophysics and Chemical Biology

16:125:589: BioMEMS/BioNano

16:765:585: Bioinformatics
 16:125:506: Artificial Implants

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RUTGERS		Overall Program	
<ul style="list-style-type: none"> This was viewed as a very successful biotechnology research training program, and there was very high enthusiasm for this renewal application. Rutgers University provides an excellent environment for predoctoral research and training in biotechnology. Institutional support for the training program is outstanding. 			
Impact	Impact/Priority Score	Descriptor	Additional Guidance on Strengths/Weaknesses
High	10	Exceptional	Exceptionally strong with essentially no weaknesses
	20	Outstanding	Extremely strong with negligible weaknesses
	30	Excellent	Very strong with only some minor weaknesses
Moderate	40	Very Good	Strong but with numerous minor weaknesses
	50	Good	Strong but with at least one moderate weakness
	60	Satisfactory	Some strengths but also some moderate weaknesses
Low	70	Fair	Some strengths but with at least one major weakness
	80	Marginal	A few strengths and a few major weaknesses
	90	Poor	Very few strengths and numerous major weaknesses

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RUTGERS		Students: Positive Comments	
<ul style="list-style-type: none"> The program has produced a high-quality trainee cohort whose members have succeeded in biotechnology careers The training program draws students from four units: Biomedical Engineering; Chemical and Biochemical Engineering; Chemistry and Chemical Biology; Molecular Biosciences (an umbrella organization for 7 life science programs). These units matriculate a sizeable pool of TGE students (61 TGE students in 2013). (Selective: 11.4%) Training outcomes are very good. Nearly all former trainees have two or more publications; 46 of 50 students (92%) who left the program over the past 10 years completed their Ph.D. degrees. Career placement in biotechnology is excellent. Of students completing the program in the past 10 years, 20 are in industrial biotechnology positions, 5 are in college or university faculty positions, and 8 are postdoctoral associates. The training program has an enviable record of URM training. Time to degree is 5.3 years. Trainees come out with good publication records and find jobs in academia (postdocs) and industry, consistent with their training. The trainees are from strong undergraduate institutions and have strong credentials. Trainees are selected from a strong pool by a highly competitive application and interview process. The outcomes are strong – an acceptably high percentage of trainees finish the Ph.D., with apparently outstanding publication records: “Of those that have completed training, the average trainee publishes 4-5 papers, and is either first or second author on 3-4.” Over the past 10 years (and consistent with previous cycles), graduates of the Biotech program have opted for different career paths (18 have gone to industry, 18 have gone to academia, 3 have started their own companies or joined start-ups as scientific or technical officers, and 7 have followed other biotechnology- related professional careers (e.g. consulting, research management, medical writing, public policy, etc.). 			

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Students: Concerns

- Some graduates with no first author **publications**
- Some former trainees have no first-author **publications**
- A surprising number of graduate students in training program faculty labs did their undergraduate training at Rutgers.
- Three former trainees do not have first-author **publications**. Although this number is not large, it is surprising that the training program does not have a policy of requiring at least one first-author publication of trainees.

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Program Trends

- As time goes on, programs become more formalized
- Pros: ensures consistency; Cons: rigidifies program elements
- Two clear changes for the future
 - IDP (Ann will discuss in the next session)
 - PMCID #s on papers to track grants (<http://www.ncbi.nlm.nih.gov/pmc/>)

Rong Gao R, Stock AM. Evolutionary tuning of protein expression levels of a positively autoregulated two-component system. *PLoS Genet.* 2013; 9: e1003927. PMID: PMC3812086

- Create an ERA Commons linked My NCBI account. A video overview is available.
- Collaborate with your colleagues to associate publications with NIH awards, and track public access compliance or declare the paper is not applicable. A video overview is available.
- Report your papers via the RPPR, or generate a PDF report for the publications section of the PHS 2590.

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Progress Report Schedule

- **October 17**: submit **progress report research paragraph** to advisor and lab members for comment
- **October 24**: submit edited research paragraph along with the **annual progress report form** to Mary Ellen for review by Maish and Ann
- **November 7**: Edited progress reports returned to students
- **November 14**: Final progress reports due
- **December 1**: IDP due
- **January, February**: Annual review meetings with Maish and Ann

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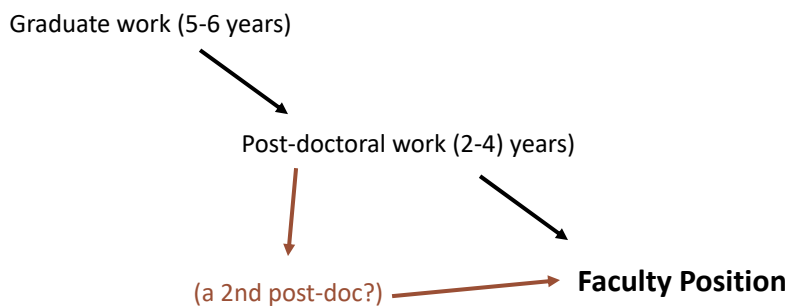
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Things Have Changed

- It was easier years ago; more positions available
- It was possible to get a position straight from grad school
- Funding climate has become more difficult
- Justification of project impact and utility has increased

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A 7-10 Year Process



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Past Postdoctoral Fellows: Academia (2005-present)					
Nahmais, Koby	2004-2006	PhD	2004	U Minnesota	Associate Professor, Bioengineering, Hebrew U
Banerjee, Ipsita	2005-2008	PhD	2005	Rutgers U	Assistant Professor, Chemical Engineering, U Pittsburgh
Uygun, Korkut	2006-2008	PhD	2005	Wayne State	Assistant Professor, Surgery and Bioengineering, Harvard U
Nagrath, Deepak	2005-2009	PhD	2004	RPI	Assistant Professor, Chemical Engineering, Rice U
Kidambi, Sri	2006-2009	PhD	2006	Michigan State	Assistant Professor, Chemical Engineering, U Nebraska
Soto, Alex	2007-2009	MD, PhD	2006	Okayama U	Assistant Professor, Surgery, U Pittsburgh
Koria, Piyush	2008-2010	PhD	2008	SUNY Buffalo	Assistant Professor, Chemical Eng, U South Florida
Berdischevsky, Eugene	2008-2011	PhD	2007	UCSD	Assistant Professor, Electrical Engineering, Lehigh U
Seker, Erkin	2008-2011	PhD	2007	U Virginia	Assistant Professor, Electrical Engineering, UC Davis
Konry, Tania	2009-2011	PhD	2007	Ben Gurion U	Associate Professor, Pharmaceutical Science, Northeastern U
Parekkadan, Biju	2008-2010	PhD	2008	MIT	Assistant Professor, Surgery and Bioengineering, Harvard U
Rai, Prakash	2010-2012	PhD	2008	RPI	Assistant Professor, Chemical Engineering, U Massachusetts
Chakraborty, Nilay	2009-2012	PhD	2009	U North Carolina	Assistant Professor, Mechanical Engineering, U Michigan
Shen, Keyue, PhD	2011-2014	PhD	2010	Columbia U	Assistant Professor, Biomedical Engineering, USC
Lee, Jungwoo, PhD	2010-2014	PhD	2009	U Michigan	Assistant Professor, Chemical Engineering, U Massachusetts
Golberg, Alex, PhD	2012-2014	PhD	2011	Hebrew U	Assistant Professor, Environmental Studies, Tel Aviv U

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<h2>Examples</h2>	
Keyue: 2 interviews, 1 offer, USC	
Jungwoo: 5+ interviews, 2 offers, U Mass Amherst	
Keyue: Postdoc: 3 years; MGH ECOR Fellowship	
Jungwoo: Postdoc 4 years; Shriners Fellowship; NIH K99/R00	
<p>NIH Pathway to Independence Award (K99/R00): Award provides up to 5 years of support in two phases. The initial (K99) phase will provide support for up to 2 years of mentored postdoctoral research training and career development. The second (R00) phase will provide up to 3 years of independent research support, which is contingent on satisfactory progress during the K99 phase and an approved, independent, tenure-track (or equivalent) faculty position.</p>	
Keyue: PhD (Columbia U): 5.5 years; 4 first author papers	
Jungwoo: PhD (U Michigan): 6 years; 6 first author papers	
Is this better than Rutgers Biotech Students?	

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1. **Nativ NI**, Ghodbane MA, Maguire TJ, Berthiaume F, Yarmush ML. "Stem Cells for Human Hepatic Tissue Engineering", **Embryonic Stem Cells - Differentiation and Pluripotency**, Chapter 15: 279-302, In Tech, 2011.
 2. **Nativ NI**, Maguire TJ, Yarmush G, Brasaemle DL, Henry SD, Guarrera JV, Berthiaume F, Yarmush ML. "Liver Defatting: An Alternative Approach to Enable Steatotic Liver Transplantation", **American Journal of Transplantation**, 12: 3176-83, 2012.
 3. **Nativ NI**, Yarmush G, Chen A, Dong D, Henry SD, Guarrera JV, Maguire TJ, Schloss R, Berthiaume F, Yarmush ML. "Rat Hepatocyte Culture Model of Macrosteatosis: Effect of Macrosteatosis Induction and Reversal on Viability and Liver-specific Function", **J Hepatology**, 59: 1307-14, 2013.
 4. **Nativ NI**, Chen A, Yarmush G, Guarrera JV, Maguire TJ, Schloss R, Berthiaume F, Yarmush ML. "Automated image analysis method for quantifying macrovesicular steatosis in hematoxylin and eosin-stained histology images of human livers", **Liver Transplantation**, 20: 228-36, 2014.
 5. **Nativ NI**, Yarmush GA, So A, Barminko J, Maguire TJ, Schloss R, Berthiaume F, Yarmush ML. "Macrosteatotic Hepatocyte Hypersensitivity to Hypoxia-Reoxygenation Is Reversed by Defatting With Agents That Promote Fatty Acid β -Oxidation", **Liver Transplantation** 20: 1000-1011, 2014
 6. **Barminko J***, **Nativ NI***, Schloss R, Yarmush ML. "Fractional Factorial Design to Investigate Stromal Cell Regulation of Macrophage Plasticity", **Biotechnol Bioengineering** 2014; Jun 2 [Epub]
1. **Nativ NI et al.** "In Vitro Model of Macrosteatotic (Fatty) Liver", U.S. Patent Application No.14/169,605, filed, January 2014
 2. **Nativ NI et al.** "Automated High-Content Image Analysis Product and Methods for Quantification of Hepatic Intra-Cellular Triglyceride", U.S. Patent No.US 20130331293 A1, published, December 2012

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Graduate School

- A good thesis project
- Apply for fellowships
- Finish in 5-6 years
- Publish (at least 2 papers)
- Attend meetings/join scientific societies
 - Present your work (poster/oral presentation)
 - Network
 - Check out potential post-doc opportunities
 - Introduce yourself to and ask potential postdoc advisors to come see your work
- Stay in touch, and keep on good terms, with your thesis advisor

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The Postdoc

- When choosing a post-doc, escalate and think fundability....and also think about spending a significant part of your future studying this or a similar problem
- Apply for fellowships
- Try to finish in 4 years
- Publish (and think big)
- Attend meetings/join scientific societies
- Try to do some type of service i.e. review papers, write portions of the PIs grant
- Set-up collaborations
- Stay in touch with and keep on good terms with your post-doc PI

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The Faculty Job Application

- Where to apply?
 - Everywhere
 - Apply to places where you think you will have a good research fit
 - 2 types of ads: broad = best athlete narrow = specific need
- When to apply
 - Ads start appearing in late summer (August/Sept) and continue through November/December
 - Most interviews start in January and run through April
- How to apply
 - 1) Cover letter
 - 2) CV
 - 3) Research accomplishments
 - 4) Research plan
 - 5) (Reprints)
 - 6) Teaching statement
 - 7) Letters of reference

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Application Screening

- Usually >100 applications; many places receive >200
- It all goes into a spreadsheet
- Committee review is usually late Dec through Jan
- Looking for 3-5 interviewees

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The Interview

What they will get from the interview:

- Are your accomplishments significant
- Is your research plan a good fit with dept.
- Are you a good communicator
- Will the faculty want to interact/collaborate with you

And how they will get it:

- 1 on 1 interviews
- formal seminar
- 'chalk talk'
- a dinner and/or lunch with a group of faculty

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The Chalk Talk

Basically your research plan

- Brief background
- What is the significant of your research?
- What's the first project you will do?
- What will you for your first grant?

Faculty can be very critical, be prepared to defend yourself calmly and clearly

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Still Interested in Academia?

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Rutgers Biotech Alumni in Academia

David Odde	PhD	1995	Professor, Biomedical Engineering, U Minnesota
Mark Riley	PhD	1995	Professor and Dept Head, Biological Systems Engineering, U Nebraska
Maura Collins Pavao	PhD	1995	Professor, Biology, Worcester State
Connie Schall	PhD	1996	Professor and Graduate Director, Chemical Engineering, U Toledo
Elizabeth Powell	PhD	1997	Associate Professor, Anatomy and Neurobiology, U Maryland
Joe Ledoux	PhD	1998	Associate Professor, Biomedical Engineering, Georgia Tech
Deanna Thompson	PhD	2001	Associate Professor, Biomedical Engineering, RPI
Elizabeth Manheim	PhD	2002	Assistant Professor, Reproductive Medicine, Weill Cornell Medical College
Scott Banta	PhD	2002	Associate Professor, Chemical Engineering, Columbia U
Joseph Freeman	PhD	2003	Associate Professor, Biomedical Engineering, Rutgers U
David Snyder	PhD	2005	Associate Professor, Chemistry, William Paterson U
Ram Sharma	PhD	2006	Assistant Professor, Biomedical Engineering, U Bath, UK
Natesh Parashurama	PhD	2007	Instructor, Reproductive Sciences, UCSF School of Medicine
Harini Sundararaghavan	PhD	2008	Assistant Professor, Biomedical Engineering, Wayne State
Jason Maikos	PhD	2008	Director, Gait and Motion Analysis Laboratory, VA NY Harbor Healthcare System

7 trainee graduates currently in postdocs (MIT, Stanford, Mount Sinai (2), U Pennsylvania, Ponce School of Medicine, RWJMS)

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iJOBS *Interdisciplinary
Job
Opportunities for
Biomedical
Scientists*

Career Panel Series


Educational Careers with a Biology PhD



Patricia Irizarry-Barreto, Ph.D.
Program Coordinator,
Rutgers Science Explorer Bus
Associate Director,
Rutgers Geology Museum



Tara Cominski, Ph.D.
Assistant Professor
College of Saint Elizabeth



Lucille O'Reilly, Ph.D.
Science Teacher
North Brunswick High School

**Tuesday, September 9, 2014
4:30 pm**

**Daniel Kessler Teaching Labs, Rooms C1/C2
Robert Wood Johnson Medical School**

All graduate students and postdoctoral fellows are welcome to attend

Sponsored by Graduate School of Biomedical Sciences at Robert Wood Johnson Medical School (GSBS at RWJMS) and Center for Innovative Ventures of Emerging Technology (CIVET)

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1. Sogn JA, **Yarmush ML**, Kindt TJ. An idiotypic marker for the VL region of a homogenous antibody. **Ann Immunol**, 1976; 127C: 597-408.
2. **Yarmush ML**, Sogn JA, Mudgett M, Kindt TJ. The inheritance of antibody V regions in the rabbit: linkage of an H chain specific idiotype to immunoglobulin allotypes. **J Exp Med**, 1977; 145: 916-930.
3. **Yarmush ML**, Kindt TD. Isolation and characterization of IgG molecules expressing latent group B allotypes from pedigreed b4b4 rabbits. **J Exp Med**, 1978; 148: 522-533.
4. Mudgett-Hunter M, **Yarmush ML**, Fraser BA, Kindt TJ. Rabbit latent group a allotypes: characterization and relationship to nominal group allotypic specificities. **J Immunol**, 1978; 121: 1132-1138.
5. **Yarmush ML**, Sogn JA, Kindt TJ. Latent allotypes: a window to a genetic enigma. **Ann Immunol**, 1979; 130C: 142-156.
6. **Yarmush ML**, Krutzsch HC, Kindt TJ. Amino acid sequence analysis of immunoglobulin light chains by gas chromatographic-mass spectrometric techniques. **Molec Immunol**, 1980; 17: 319-326.
7. **Yarmush ML**, Mandy WJ, Kindt TJ. Evidence for linked expression of latent allotypes of the heavy chain constant and variable regions. **J Immunol**, 1980; 124: 2864-2869.
8. **Yarmush ML**, Gates FT, Weisfogel DR, Kindt TJ. Identification and characterization of rabbit-mouse hybridomas secreting rabbit immunoglobulin chains. **Proc Natl Acad Sci**, 1980; 77: 2899-2903.
9. **Yarmush ML**, Sogn JA, Kern PD, Kindt TJ. Role of immune recognition in latent allotype induction and clearance: evidence for allow-type network. **J Exp Med**, 1981; 153: 196-206. PMID: PMC2186050.
10. **Yarmush ML**, Gates FT, Dreher KL, Kindt TJ. Serologic and structural characterization of immunoglobulin chains secreted by rabbit-mouse hybridomas. **J Immunol**, 1981; 126: 2240-2244.
11. Wolf B, Currie EP, **Yarmush ML**. Expression of cell-surface latent allotypes: latent specificities are synthesized only by cells that display the nominal allotype. **J Immunol**, 1981; 126: 2490-2493.
12. Kindt TJ, **Yarmush ML**. Expression of Latent Immunoglobulin Allotypes and Alien Histo-Compatibility Antigens: Relevance to Models of Eukaryotic Gene Regulation. **Crit Rev Immunol.**, 1981; 2: 297-348.

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