

Mission Statement (Version October 12, 2010)

“QuBi Concentrators will learn statistical and computational methods and apply these methods to the processing, storage, analysis, visualization, and modeling of large-scale molecular biomedical data. They will also develop the research, communication, and collaboration skills to contribute to the solution of bioinformatics problems as members of multidisciplinary teams”

# QuBi News

Quantitative Biology Education & Research at Hunter College

Spring, 2015

## Congratulations to QuBi'15 Graduates

- ❖ Biology Majors  
**Arman Akter** | **Thahmina Ali** (Dr Krampis Lab) | **Asmaa Butt** | **Thomas Hart** (Macaulay Honors College; Department Honor; Seringhaus Award; Dr Xie Lab; will attend Rockefeller University doctoral program) | **Sabeel Kazi** | **Djibril Keita** | **Lyle Kingsbury** (Department Honor; Dr Melendez-Vasquez Lab; will attend UCLA doctoral program in neuroscience) | **Raymond Liang** (Macaulay Honors College; Department Honor; Drs Qiu & Xavier Labs) | **Rayees Rahman** (Drs Qiu & Xavier Labs) | **Girish Raramttan** (Department Honor; Seringhaus Award; Dr Qiu Lab; Bioinformatics Analyst at University of Michigan) | **Maqsood Rukhinda** | **Vincent Setang**
- ❖ Computer Science Majors  
**Baekdoo Kim** (Dr Krampis Lab)
- ❖ Mathematics & Statistics Majors  
**Samuel Hosmer** (Dr Krampis Lab; will attend CUNY Graduate Center doctoral program in Mathematics) | **Dylan Sun** (Macaulay Honors College; Department Honor; will attend University of Michigan's Master's Program in Biostatistics with full tuition & stipend)

### Alumni News

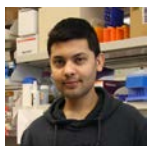
- **Vincent Xue (CS-QuBi, 2011): 3<sup>rd</sup> Year doctoral students at MIT**
- **Yözen Hernández (CS-QuBi, 2010): 4th year doctoral student at Boston University**
- **Linda Huang (CS-QuBi, 2014). Bioinformatics Analyst, Weil Cornell Medical College**
- **Akanksha Verma (CS-QuBi, 2014). Bioinformatics Analyst, Weil Cornell Medical College**



Hart



Hosmer



Raramttan

## QuBi Enrollment & Graduates

	Active	Graduated	Med/Grad School
<b>Biology</b>	25	16	6
<b>Computer Science</b>	12	11	5
<b>Chemistry</b>	24	7	4
<b>Mathematics/Statistics</b>	11	11	2
<b>Total</b>	72	45	17

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## Student Co-authored Research Publications

- Afshinnekoo E, Ebrahim C, **Chowdhury S**, et al. (2015). Geospatial resolution of human and bacterial diversity with city-scale metagenomics. *Cell Systems*. 1, 1-15 ([Read press coverage by ScienceDaily](#))
- **Janet Borrero**, Mande Holford, Saad Mneimneh (2015). Classification of Cone Snail Toxins Using Profile Hidden Markov Models. *Hunter College Undergraduate Research Conference*. (Award-winning poster)
- Che L Martin, Tika Y Sukarna, Saymon Akther, **Girish Ramrattan**, **Pedro Pagan**, Lia Di, Emmanuel F Mongodin, Claire M Fraser, Steven E Schutzer, Benjamin J Luft, Sherwood R Casjens, Wei-Gang Qiu. (2015). Phylogenomic identification of regulatory sequences in bacteria: an analysis of statistical power and an application to *Borrelia burgdorferi sensu lato*. *mBio* 6(2): e00011-15.
- Lhota J, Hauptman R, **Hart T**, **Ng C**, Xie L (2015). A new method to improve network topological similarity search: applied to fold recognition. *Bioinformatics*. [Feb 2015, Epub ahead of Print].
- Xie L, Ge X, Tan H, Xie L, Zhang YL, **Hart T**, Yang XW, Bourne PE (2014). Toward structural systems pharmacology to study complex diseases and personalized medicine. *PLoS Computational Biology* 10 (5):e1003554.
- Lia Di, **Pedro E Pagan**, **Daniel Packer**, Che L Martin, Saymon Akther, **Girish Ramrattan**, Emmanuel F Mongodin, Claire M Fraser, Steven E Schutzer, Benjamin J Luft, Sherwood R Casjens and Wei-Gang Qiu. (2014). BorreliaBase: a phylogeny-centered browser of *Borrelia* genomes. *BMC Bioinformatics* 15:233.
- **Ng C**, Hauptman R, Zhang, Y.L., Bourne, P.E. Xie L (2014) Anti-infectious drug repurposing using an integrated chemical genomics and structural systems biology approach. *Pacific Symposium of Biocomputing*. pp.136-147.
- Xie L, **Ng C**, **Ali T**, Valencia V, Ferreira BL, **Xue V**, **Tanweer M**, Zhou D, Haddad G, Bourne PE, Xie L. (2013) Multiscale modeling of the causal functional roles of nsSNPs in a genome-wide association study: application to hypoxia, *BMC Genomics* 14(S3):S9.
- Mongodin EF, Casjens SR, Bruno JF, Xu Y, Drabek EF, Riley DR, Cantarel BL, **Pagan PE**, **Hernandez YA**, **Vargas LC**, Dunn JJ, Schutzer SE, Fraser CM, Qiu WG, Luft BJ. (2013). Inter- and intra-specific pan-genomes of *Borrelia burgdorferi sensu lato*: genome stability and adaptive radiation. *BMC Genomics* 14(1): 693.
- **Xue V**, Burdett T, Lukk M, Taylor J, Brazma A, Parkinson H. (2012). MageComet – web application for harmonizing existing large-scale experiment descriptions. *Bioinformatics*. 28 (10):1402-3.
- Casjens SR, Mongodin EF, Qiu W-G, Luft BJ, Schutzer SE, Eddie B. Gilcrease, Wai Mun Huang, Marija Vujadinovic, John K. Aron, **Levy C. Vargas**, **Sam Freeman**, Diana Radune, Janice F. Weidman, George I. Dimitrov, Hoda M. Khouri, Julia E. Sosa, Rebecca A. Halpin, John J. Dunn, Claire M. Fraser. (2012) Genome Stability of Lyme Disease Spirochetes: Comparative Genomics of *Borrelia burgdorferi* Plasmids. *PLoS ONE* 7(3): e33280.
- Dannenfels D, Lachmann A, **Szenk M**, Ma'ayan A. (2012). FNV: light-weight flash-based network and pathway viewer. *Bioinformatics* 27 (8):1181-1182.
- Haven J, **Vargas LC**, Mongodin EF, **Xue V**, **Hernandez Y**, **Pagan P**, Fraser-Liggett CM, Schutzer SE, Luft BJ, Casjens SR, Qiu WG. (2011). Pervasive Recombination and Sympatric Genome Diversification Driven by Frequency-Dependent Selection in *Borrelia burgdorferi*, the Lyme disease Bacterium. *Genetics*. 189:951-966.
- Nia, S, Gong, XC, Drain, CM, Jurow, M, **Rizvi, W**, and **Qureshy, M**. (2010). Solvent-free synthesis of meso- tetraarylporphyrins in air: product diversity and yield optimization. *Journal of Porphyrins and Phthalocyanines*. 14 (7):621-629.
- Qiu WG, Bruno JF, **McCaig WD**, Xu Y, Livey I, Schriefer ME, Luft BJ. (2008). Wide distribution of a high-virulence *borrelia burgdorferi* clone in Europe and North America. *Emerging Infectious Diseases*. 14 (7): 1097-1104.

\* **QuBi student**, Hunter Mentor



**Looking Ahead:  
QuBi Courses in Summer &  
Fall 2015**

**BIOL  
470.83**

Summer Bioinformatics  
Workshop  
Summer I  
Professor Krampis

**CSCI 132**

UNIX & Perl  
Programming  
Mon & Thu  
Professor Stewart Weiss

**CSCI 232**

Relational Database & SQL  
Tu & Thur  
Professor Xie

**STAT 319**

Bayesian Methods in  
Sciences  
Tu & Thu  
Professor Mneimneh

**BIOL 375**

Molecular Evolution  
Mon & Thu  
Professor Qiu

**MIT Quantitative Biology  
Workshop  
January 2-9, 2015  
Cambridge, MA**

- Angelina Volkova (Chemistry; accepted as a Summer intern in MIT)
- Dalencourt Christian (Biology)
- Tom Hart (Biology)
- Baekdoo Kim (Computer Science)
- Dylan Sun (Statistics)
- Samuel Hosmer (Mathematics)
- Dr Saad Mneimneh (Faculty Lecturer; Computer Science)
- Dr Weigang Qiu (Faculty Advisor, Biology)



**MIT Workshop Alumni**

2011	2012	2013	2014
Llya Korsunsky (CS)	Gabriel Deards (Stat)	Melanie Balmick(Stat)	Henna Ahmed (CS)
Geoffrey Rice (CS)	Yaroslav Melnyk (Math)	Anna Feitzinger	Nanda Mijola (Stat)
Kathleen McGovern (Math)	Joan Marc (CS)	(Chem)	Raees Rahman (Bio)
Pedro Pagan (Bio)	Clara Ng (CS)	Daniel Packer (CS)	Girish Ramrattan (Bio)
Prof. Dana Sylvan (Stat)	Amardeep Singh (Bio)	Linda Huang (CS)	Akansh Verma (CS)
	Prof. Ed Binkowski (Stat)		Prof. Saad Mneimheh (CS)



## Quantitative Biology Labs at Hunter & Neighbors

**Dr Akira Kawamura** (Chemistry): Chemical genomics & communications between microbes and plants | **Dr Mandè Holford** (Chemistry): Venom arsenal of marine invertebrates | **Dr Saad Mneimneh** (Computer Science): Algorithms for biological problems such as RNA folding & identification of toxin in corn snails | **Dr Lei Xie** (Computer Science): Structural & systems biology | **Dr Konstantinos Krampis** (Biology): Cloud-based bioinformatics infrastructure | **Dr Weigang Qiu** (Biology): Microbial pathogen genomics, evolution & informatics | **Dr Levi Waldron** (School of Public Health): Biostatistics and R tool development | **Dr Joao Xavier** (Memorial Sloan Kettering Cancer Center, Computational Biology Group): Experimental and systems evolution of microbial pathogens | **Dr Olivier Elemento** (Weil Cornell Medical College, Institute for Computational Biomedicine): Cancer genomics & precision medicine.



### About QuBi

**Background.** In 2003 the National Research Council published *BIO2010*, a report that recommends replacing the traditional model of undergraduate biology curricula with a “strong interdisciplinary curriculum that includes physical science, information technology, and mathematics.” Hunter College was one of the nine awardees of a NIH/NIGMS/MARC program during 2008-2013 to transform undergraduate biology curricula. Today, QuBi mission continues with support from Hunter Administration and the four participating Departments.

#### Program Highlights

- **Five Bioinformatics Concentrations.** We have designed and implemented five new bioinformatics concentrations in Biology, Computer Science, Chemistry, Mathematics, and Statistics. Course requirements for the five concentrations are available at [QuBi website](#). Watch [what students and faculty say about QuBi](#).
- **Over Twenty New & Revised Courses and Lab Modules.** We have designed and implemented six new quantitative biology courses and revised over twenty existing courses. Each year, over two thousand Hunter students are exposed to quantitative biology & bioinformatics through these revised courses.
- **Wiki Syllabi** of new and revised courses and modules: ♦[BIOL 425](#) Computational Molecular Biology (QuBi capstone course; [course wiki](#)) ♦[BIOL 470.83](#) Summer Bioinformatics Workshop ([course wiki](#)) ♦[BIOL 203](#) Molecular Genetics; Lab 4 ([module wiki](#)). ♦[BIOL 203](#) Lab 7 ([module wiki](#)) ♦[BIOL 303](#) Cell Biology ([module wiki](#))
- **Program Publications:** ♦[Alaie, Teller & Qiu \(2012\) A Bioinformatics Module for Use in an Introductory Biology Laboratory.](#) *American Biology Teacher* 74(5):318-322. ♦[Mneimneh \(2012\) Crossing over...Markov meets Mendel.](#) *PLoS Computational Biology* 8(5):1-12.

### QuBi Advisors

- Dr Saad Mneimneh <saad@hunter.cuny.edu> (Statistics)
- Dr Lei Xie <lei.xie@hunter.cuny.edu> (Computer Science)
- Dr Akira Kawamura <akawamur@hunter.cuny.edu> (Chemistry)
- Dr Weigang Qiu <weigang@genectr.hunter.cuny.edu> (Biology)

#### Former Advisors & Administrator

- Ms Veronica Lichman (Mathematics, 2008-2014)
- Dr Virginia Teller (Computer Science, 2003-2013)
- Dr Dana Sylvan (Mathematics & Statistics, 2008-2015)
- Dr Makram Talih (Statistics, 2003-2007)
- Dr Ronald Neath (Statistics, 2010-2014)
- Dr Adrienne Alaie (Biology, 2003-2012)

