



Institute for Systems Genomics Newsletter

Message from the Director

The Institute for Systems Genomics (ISG) was established in November 2012 with a mission to coalesce the interdisciplinary research strengths of 11 schools and colleges at the University of Connecticut, its affiliated hospitals, and the Jackson Laboratory.

The ISG leverages significant investment from the state, including the \$865 million Bioscience Connecticut initiative, \$172 million Tech Park program, \$200 million Bioscience Innovation Fund, and \$1.7 billion Next Generation Connecticut. In addition, the ISG has received commitments for 19 faculty positions and the endowed Krenicki Professorship in Genomics & Personalized Medicine.

The dedicated faculty and staff of the ISG's ecosystem are training the next generation of genome scientists through collaborative, vigorous, and innovative research programs in areas related to functional and systems genomics; computational biology and bioinformatics; human, mammalian, microbial, pharmacological, immunological, statistical, and population genomics; and educational, ethical, legal, and social implications of genomic science and medicine.

John and Donna Krenicki Endowed Professorship in Genomics & Personalized Medicine

After a national search, Dr. Brenton Graveley, Professor of Genetics and Developmental Biology, was selected as the inaugural **John and Donna Krenicki Endowed Professorship in Genomics and Personalized Medicine**. Dr. Graveley is an international authority on the role that RNA plays in biology and disease. By studying the genome of *Drosophila* – the common fruit fly – he and his team have discovered thousands of new genes and tens of thousands of new ways in which communication occurs among them. His research can serve as a foundation for breakthroughs in personalized medicine.

Upcoming Events

Institute for Systems Genomics Annual Networking Workshop

The ISG's first annual Networking Workshop will be held on Tuesday, **May 13, 2014** in the Student Union Ballroom, 2110 Hillside Road, Storrs, CT, and will feature presentations by new members of the genomics community at UConn and JAX Connecticut. The goal of the workshop is to promote collaborations and discuss new research projects, technology, and education. For more information on the workshop, please contact Stephanie Holden at sholden@uchc.edu.

ISG Welcomes New FY2014 Recruits (Resulting from the Faculty Hiring Plan)

Mukul Bansal, assistant professor, joins UConn with a dual appointment in Computer Science & Engineering and Biomedical Engineering. He received his Ph.D. from Iowa State University in 2009, and brings expertise in computational biology and bioinformatics. He has held postdoctoral positions at the Massachusetts Institute of Technology and the Blavatnik School of Computer Science at Tel Aviv University, Israel.

Haim Bar, assistant professor, joins the Department of Statistics. Bar was a postdoc and lecturer at Cornell University, where he received his Ph.D. degree in 2012. Bar's research interests include statistical modeling for high-throughput data, variable selection, and missing-data problems. He is also interested in statistical methods in machine learning.

Kevin Brown, assistant professor, joins the Department of Biomedical Engineering. Brown is a theoretical and computational systems biologist and systems neuroscientist. He studies complex biological systems, employing methodology from dynamical systems, Bayesian and nonparametric statistics, computational biology, and statistical signal processing. His work has focused heavily on inverse problems, inferring network and model structures from cellular time series measurements, protein sequences, and high-dimensional brain data. His work is strongly connected to experimental data.

Yongku Cho, assistant professor, joins the Chemical & Biomolecular Engineering Department. He received his Ph.D. from the University of Wisconsin-Madison in 2010. Cho's research centers on protein engineering, optogenetics, neuroimaging, and molecular neurobiology. He was most recently a postdoctoral researcher at the Massachusetts Institute of Technology, where his work involved the molecular engineering of light-activated proteins.

John Malone, assistant professor, joins the Department of Molecular and Cell Biology. Malone's laboratory investigates the relationship between gene dosage and phenotype, with a focus on copy number variants, sex chromosomes, and dosage compensation in a developmentally interesting group, frogs, and the important model genetic system of *Drosophila*. The long-term goal of the laboratory is to identify the mechanisms that produce gene dose sensitivity, in order to understand how changes in gene dose impact evolution, behavior, and human disease.

Yong-Jun Shin, assistant professor, joins the Department of Biomedical Engineering. He received his Ph.D. from the University of Texas at Dallas in 2010, and his MD from Seoul National University. Shin's research expertise encompasses biological applications of estimation and control theory, multi-scale modeling of biological tissues, and digital microfluidics/bioMEMs. Shin was a postdoctoral researcher at Cornell University prior to joining UConn.

Leighton Core, assistant professor, will join the Department of Molecular and Cell Biology in Fall 2014. Core uses whole genome analysis techniques to better understand the regulation of RNA transcription in cells of humans and of model organisms.

Erin Young, assistant professor, will join the School of Nursing in Fall 2014. Young investigates the genetic mechanisms that regulate distinct types of neuropathic sensory abnormalities associated with pain in the mouse model organism.

UConn Health/JAX Joint Recruitments

Reinhard Laubenbacher, first joint academic appointment with UConn Health and JAX Genomic Medicine. Dr. Laubenbacher is an accomplished and internationally recognized mathematician and systems biologist. He serves as the co-director of UConn Health's new Center for Quantitative Medicine. His focus is on implementing mathematical algorithms and related software to support research connected to biomedical problems, including genomic and other approaches to personalized medicine.

With the goal of advancing the collaborative Genomics and Personalized Medicine programs being developed at UConn and JAX, we are coordinating the 10 joint hires allocated to UConn Health/JAX with those committed to the Institute for Systems Genomics. This will allow us to maximize the major investments in Bioscience and NextGen Connecticut and achieve integration with the University visioning process. For this purpose, we have assembled a Strategic Planning Group: Marc Lalande (UConn ISG), Jacques Banchemereau (JAX Genomic Medicine), Peter Gogarten (UConn Molecular & Cellular Biology), Brenton Graveley (UConn ISG), Victor Hesselbrock (UConn Medicine), Charles Lee (JAX Genomic Medicine), Monty MacNeil (UConn Dental Medicine), Jeff Seemann (UConn VP Research), Dong-Guk Shin (UConn Computer Science & Engineering), and George Weinstock (JAX Genomic Medicine).

Position Descriptions:

- Center for Quantitative Medicine/Dental School** (Contact person: Reinhard Laubenbacher)
 UConn Health is engaged in a major expansion of its research programs in computational biology, bioinformatics, and systems biology, as part of several transformative state initiatives. The Bioscience Connecticut initiative will expand health care offerings and research capabilities at UConn Health, including the establishment of the new Center for Quantitative Medicine. Other initiatives include the establishment at UConn Health of the new Jackson Laboratory for Genomic Medicine and the Institute for Systems Genomics. The UConn Health School of Dental Medicine is recruiting a faculty member at the assistant or associate professor level in computational biology, who will play an important role in integrating these different initiatives. The successful candidate will have expertise in computational approaches to metagenomics and microbiome biology, as well as genomic data management, and will be able to collaborate with School of Dental Medicine faculty in areas of microbial ecology and/or host-pathogen interactions as they pertain to oral diseases.
 Apply now, go to: <https://jobs.uhc.edu>, search 2014-483.
- Statistical Genetics and Genomics – Psychiatry** (Contact person: Dr. Brenton Graveley)
 The Department of Psychiatry at the UConn Health and the Jackson Laboratory (JAX) are jointly seeking to recruit an outstanding individual with expertise in statistical genetics / genomics for a tenure-track faculty position at the Assistant, Associate or Full Professor level. Areas of specialization for the candidate include, but are not limited to, cutting-edge analyses of large, population-scale GWAS, exome, whole genome, and metagenomic datasets, as well as genomic data management. Candidates with a background in the genetics of addictions and behavioral health who can integrate pharmacogenetic data and clinical phenotypes are particularly encouraged to apply.

FY2015 Searches for ISG Faculty (Underway and Planned)

- **Faculty openings in the School of Engineering and Institute for Systems Genomics** (Contact person: Dong-Guk Shin). The recently established [Institute for Systems Genomics](#) and the School of Engineering at the University of Connecticut invite applications for multiple tenure-track faculty positions at the assistant, associate, or full professor level, with an expected start date of August 23, 2014. The research specialties of interest include, but are not limited to, computational biology, bioinformatics, systems biology, big data analysis, genomics data interpretation and visualization, biological databases, biomedical literature mining, and related areas. Successful candidates will be expected to actively engage in collaborative research projects and teach in the new Institute-based graduate programs. [Apply now, go to: Husky Hire Website.](#)
- **The Department of Genetics and Developmental Biology and the Institute for System Genomics** (Contact person: Marc Lalande) The Department and the ISG are seeking highly qualified individuals with an outstanding background in genomics, genetics, and/or developmental biology. Areas of interest include, but are not limited to, computational genomics, developmental genetics, epigenomics, gene expression, and noncoding RNAs. [Apply now, go to: https://jobs.uchc.edu](https://jobs.uchc.edu), search 2010.365.

New Research Pilot Projects

- **Affinity Research Collaborative Projects**
 - Early Life Physiological and Psychosocial Stress Imprints Gut Microbiome in Preterm Infants
 - Chromatin Interactions, Epigenomics, and Transcriptional Response to Drug Induction
 - Use of Diversity Outbred Mice to Study Cardiotoxicity of Chemotherapeutic Agents
 - Neuronal Synaptic and Circuit Dysfunction in the Autism Spectrum Disorders
- **Center for Single Cell Genomics** The ISG and the Vice-President for Research are working to create a Center for Single Cell Genomics that will catapult UConn to global prominence in this emerging and cutting edge technology. The Center's creation involves the installation of cell preparation and microfluidic analysis platforms for single cell profiling and genomic analyses in partnership with The Jackson Laboratory and Fluidigm, a leading industry pioneer in single-cell analysis technology. The first equipment platform has just been delivered to Dr. Craig Nelson's laboratory in the Department of Molecular and Cellular Biology. (Research Administration contact person: Andrew Zehner)
- **Bioscience Innovation Fund.** The Connecticut Bioscience Innovation Fund seeks to drive innovation in the biosciences throughout Connecticut by providing focused financial assistance to startups, early-stage businesses, non-profits, and accredited colleges and universities. Connecticut Innovations will manage the \$200 million fund, which will make investments over the next 10 years in the form of grants, equity investments, loans, and loan guarantees to foster innovation. The fund will provide the means to speed bioscience breakthroughs with commercialization potential to market.

New Collaborative Research Proposal Submissions

- Gene Network Wiring in Williams-Beuren Syndrome, NIH, Dashzeveg Bayarsaihan and Dong-Guk Shin
- A Center for Out-of-Core Processing of NGS Data, NIH, Sanguthevar Rajasekaran (PI)
- Integrated Knowledge Environment Seamlessly Interlinking LINCS/BD2K Resources, NIH, Dong-Guk Shin (PI)
- Accumbens Transcriptome after Alcohol and Methamphetamine, NIH/NIDA/NIAAA, (MPI: Jonathan Covault, Brenton Graveley, Richard Mains)
- Integrative analyses of multi-dimensional networks of transcription regulation, NIH/NHGRI, (Yijun Ruan, PI; Ed Liu, co-PI, Brenton Graveley, co-PI, Mark Gerstein, co-PI)
- Modeling the regulated cellular response to a steroid hormone, NIH/NHGRI, (Sue Celniker, PI; Brenton Graveley, co-PI; Gary Karpen, co-PI; Peter Cherbas, co-PI)
- Mechanisms of motoneuron degeneration in human models of spinal muscular atrophy, NIH, (Xue-Jun Li, PI; Brenton Graveley, co-PI)
- Elucidating the role of mitochondria in motor neuron-specific degeneration using human pluripotent stem cell-based models of spinal muscular atrophy, CT Stem Cell Fund, (Xue-Jun Li, PI; Brenton Graveley, co-PI)

Industry Liaisons

Oxford Nanopore, a UK-based technology company, is developing nanopore sequencers that have the potential to radically change the landscape of genomics. The first sequencer they are pushing toward market release is the MinION, which is the size of a USB thumb drive, sequences single molecules in real time, and operates by plugging into the USB port of a laptop computer. Oxford Nanopore announced the MinION Access Program to allow a select group of researchers to test the MinION device prior to commercial release. The Graveley lab was selected as one of the labs to participate in the MinION Access Programme, and will be testing this exciting new equipment in the next few months.

Graduate Program

The ISG-based Graduate Program will offer opportunities in research and coursework in the broadly defined field of Systems Genomics under specific areas of concentration. The goal of this program is to train the next generation of genome scientists. The hallmarks of the training objective will be to provide students with the ability to self-learn, with skills for critical thinking and with high flexibility. Dr. Michael O'Neill, Assistant Director of the ISG, Dr. Peter Diplock (UConn Center for Excellence in Teaching and Learning), Dr. Holly Fitch (UConn Psychology), Dr. Peter Gogarten (UConn Molecular & Cellular Biology), Dr. Reinhard Laubenbacher (JAX/UConn Center for Quantitative Medicine) and Dr. Dong-Guk Shin (UConn Computer Science & Engineering) are finalizing the curriculum. This will be presented to the ISG Curriculum and Course Committee as the next step to Institutional approval.

Funding Opportunities

- **Identification of Gene Variants for Addiction Related Traits by Next-Gen Sequencing in**

Model Organisms Selectively Bred for Addiction Traits (UH2/UH3)

<http://grants.nih.gov/grants/guide/pa-files/PA-14-010.html>. Next application date: June 30, 2014. The goals of this initiative are to: 1) develop strategies and methodologies for the sequencing, mapping, and genomic analyzing of established phenotypes of selectively bred animal models with addiction traits, and 2) identify, from new or existing selectively bred animal models, genetic variants with implications for addiction-related traits.

- **Notice of Participation of the National Institute on Drug Abuse in RFA-HG-14-020 "Development of Software and Analysis Methods for Biomedical Big Data in Targeted Areas of High Need (U01)"** – NIDA has joined [RFA-HG-14-020](#), "Development of Software and Analysis Methods for Biomedical Big Data in Targeted Areas of High Need (U01)." In response to the spectacular opportunities and immense challenges presented by the dawning era of "Big Data" in biomedical research, the NIH has developed the Big Data to Knowledge (BD2K) initiative. The purpose of this BD2K U01 Funding Opportunity Announcement (FOA) is to solicit development of innovative analytical methods and software tools in the four topic areas of data compression/reduction, data visualization, data provenance, and data wrangling, as part of the overall BD2K initiative. It is not expected that software and methods developed under this FOA will be fully hardened, but rather that investigators show a novel approach to a difficult problem and show some proof-of-concept for this new approach, using relevant biomedical Big Data. There is no Principal Investigator citizenship restriction. Foreign institutions are not eligible, but [foreign components](#) are allowed. It has a single submission date, May 19, 2014, and earliest funding will begin in March 2015. The projects may last for three years. Annual direct costs are a maximum of \$300,000. Please see our [notice of participation](#).
- [Ruth L. Kirschstein National Research Service Award \(NRSA\) Individual Predoctoral Fellowship \(Parent F31\) \(PA-14-147\)](#). Application receipt/submission date(s): multiple dates, see announcement.
- [Ruth L. Kirschstein National Research Service Award \(NRSA\) Individual Predoctoral Fellowship to Promote Diversity in Health-Related Research \(Parent F31 – Diversity\) \(PA-14-148\)](#). Application receipt/submission date(s): multiple dates, see announcement.
- [Ruth L. Kirschstein National Research Service Award \(NRSA\) Individual Postdoctoral Fellowship \(Parent F32\) \(PA-14-149\)](#). Application receipt/submission date(s): multiple dates, see announcement.
- [Ruth L. Kirschstein National Research Service Award \(NRSA\) Individual Predoctoral MD/Ph.D. or Other Dual-Doctoral Degree Fellowship \(Parent F30\) \(PA-14-150\)](#). Application receipt/submission date(s): multiple dates, see announcement.
- [Early Stage Development of Technologies in Biomedical Computing, Informatics, and Big Data Science \(R01\)](#). Application due date(s): Feb. 5, June 5, Oct. 5; expiration date: May 8, 2017.
- [Development of Software and Analysis Methods for Biomedical Big Data in Targeted Areas of High Need \(U01\)](#). Application due date: June 19, 2014; expiration date: June 20, 2014.
- [Interpreting Variation in Human Non-Coding Genomic Regions Using Computational Approaches and Experimental Assessment \(R01\)](#). Application receipt dates: Jan. 21, 2014 and Jan. 21, 2015; expiration date: Jan. 22, 2015.
- [Ethical, Legal, and Social Implications \(ELSI\) of Genomic Research Exploratory/Developmental Research Grant Award \(R21\)](#). Application due dates: Feb. 16,

June 16, Oct. 16; expiration date: Sept. 8, 2014.

- [**Ethical, Legal, and Social Implications \(ELSI\) of Genomic Research Regular Research Program \(R01\)**](#). Application due dates: Feb. 16, June 16, Oct. 16; expiration date: Sept. 8, 2014.
- [**Avenir Award Program for Genetics or Epigenetics of Substance Abuse \(DP2\)**](#). Application due date: Aug. 18, 2014.