SCIENCE @ RENSSELAER

School of Science Milestones and Vision
Spring Town Meeting
Curt Breneman, Dean
January 25, 2017

Topics for Today

- The School of Science in the News

- School of Science Highlights

- The State of the School of Science

- Preparations fo the Summer Arch and **art_**x

- The FY18 School of Science Performance Plan

  - Rensselaer "Teaching Fellow" program for FY18 & FY19

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Rensselaer Science Highlights

Sibel Adali – Appointed Associate Head of the Department of Computer Science

Lee Ligon – Appointed Associate Head of the Department of Biological Sciences

Kim Lewis – Appointment Associate Head of the Department of Physics, Applied Physics and Astronomy

Shawn-Yu Lin – Receives the Nanotechnology Council Pioneer Award

Kevin Rose – recognized for "Calculating the Role of Lakes in Global Warming"

Chulsung Bae – $2.2 Million, Part of ARPA-E Effort To Overcome Current Battery and Fuel Cell Limitations

Heng Ji – Invited to join the World Economic Forum's Global Future Council

Shawn Yu Lin – Winner of the 2016 IEEE Pioneer Award in Nanotechnology

Jim Hendler – receives AAAI Distinguished Service Award

Fran Berman – Confirmed by the U.S. Senate to serve on the National Council on the Humanities.

Stacy Patterson – Clare Booth Luce Assistant Professor of Computer Science earns NSF CAREER Award

Rensselaer Science in the News

President Shirley Ann Jackson – Awarded the ***2016 National Medal of Science***

James Hendler named ACM 2016 Fellow –
Recognized for Advances that Are Transforming Science and Society

Rensselaer Expert in Data Mining Named Fellow of IEEE:
Mohammed Zaki *selected for "contributions to knowledge discovery and data mining"*

Morgan Schaller *– "Extraterrestrial Impact Preceded Ancient Global Warming"*

James Hendler and Alice Mulvehill *offer an independent assessment on*
"Social Machines – A Guide to Artificial Intelligence Technologies in Social Interactions"

Jen Hurley - *Tracking the Circadian Clock: Multiscale modeling to predict interactions between the genome, proteome, and metabalome throughout the circadian cycle*

Rick Relyea *- National Science Foundation Supports Completion of The Jefferson Project at Lake George Sensor Network*

Scott Forth – *"Measuring the Forces of Biology"*

Lirong Xia - *Named One of "AI's 10 to Watch"*

Robert Linhardt *–"Nano-Decoy Lures Human Influenza A Virus to its Doom"*
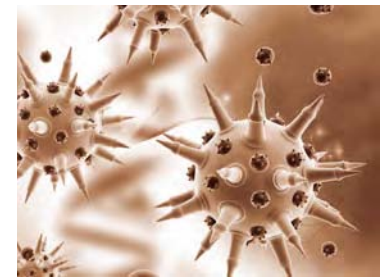
"The Science of today is the Technology of tomorrow" – Edward Teller

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Rensselaer Science Staff News

New Staff

Shannon Carrothers – Administrative Coordinator in Computer Science

Erica Eberwein – Instructional Support Coordinator in Computer Science

Victoria (Vicki) Fitzgerald – Student Services Coordinator in Computer Science

Kevin Melsert – Laboratory Supervisor in the Department of Physics, Applied Physics and Astronomy

Staff Retirement

Pamela Paslow – Administrative Coordinator in Computer Science

Passed Away

Terry Hayden – Senior Student Services Administrator

Terry joined the department in 1995, working first with both undergraduates and graduate students, but then focusing entirely on graduates as the department grew. Faculty, staff and students all had the highest respect for her. She was the department's institutional memory. Terry will be greatly missed.

2016 SoS SuperTeachers

Faculty who achieved a DMS teaching evaluation:

- Score ≥ 4.75 Spring, ≥4.8 Fall;
    - Class size of at least eight students (grad) or 10 students (undergrad)
    - A minimum of 50% response rate

Spring 2016

- Jeff Banks
- Dave Isaacson
- Ash Kapila
- Bruce Watson
- Margarita Kirova-Snover
- Elliot Anshelevich
- Mimi Katz
- James Malazita (STS)
- Rich Plotka
- Ethan Brown

Fall 2016

- Donna Krone
- Vasillis Zikas
- Jeff Banks
- Eric Mazzone
- Vincent Meunier
- Stacey Patterson
- Margarita Kirova-Snover
- Peter Fox
- Rich Plotka
- David Goldschmidt
- Liz Sprague
- Joyce McLaughlin

And now: Our Large-format SuperTeachers!

Large Format SuperTeachers

Faculty who achieved a DMS teaching evaluation:
- Score ≥ 4.3 Spring, ≥4.5 Fall;
  - Class size of at least 100 students
  - A minimum of 40% response rate

Spring 2016

- Yong Sung Kim
- David Schmidt
- Elliot Anshelevich
- Alex Ma
- Sibel Adali
- Gina Kucinski
- David Goldschmidt
- Maya Kiehl

Fall 2016

- David Goldschmidt (Double SuperTeacher!)
- Joe Ecker
- Mark Holmes
- Elliot Anshelevich
- Elizabeth Kam
- David Schmidt
- Maya Kiehl

New Faculty

Alex Gittens

Assistant Professor of Computer Science

Dr. Gittens received his B.S. degrees in Electrical Engineering and Mathematics in 2006 from California Institute of Technology. He then earned a Ph.D. in Computational Mathematics in 2013 from the University of Houston, after which he was a Research Scientist at eBay Research Laboratory (2013-2015). Prior to joining the Department of Computer Science, Dr. Gittens was a Postdoctoral Researcher in the International Computer Science Institute and the Department of Statistics at the University of California, Berkeley.

Dr. Gittens's research interest focuses at the intersection of large-scale machine learning, high-dimensional probability and statistics, and numerical linear algebra. He applies these techniques to develop statistical and computational theory and tools to extract value from massive datasets.

New Faculty

Scott Forth

Assistant Professor of Biological Science

Dr. Forth holds a BA degree in physics and a BM in music performance from Oberlin College, after which he earned a PhD in Physics from Cornell University. He has been a Postdoctoral Research Fellow at Rockefeller University since receiving his PhD degree. He held an NIH NRSA postdoctoral fellowship in the laboratory of Professor Tarun Kapoor, Laboratory of Chemistry and Cell Biology.

Dr. Forth's research program focuses on the molecular mechanisms that power and control the physical motion of genetic material within cells as they undergo division and replication.

New Faculty

Jake Shelley

Alan Paul Schulz Career Development Assistant Professor and of Chemistry & Chemical Biology

Dr. Shelley received a BS. degree in Chemistry with a minor in Mathematics from Northern Arizona University, after which he earned a PhD in Analytical Chemistry with a minor in Physical Chemistry from Indiana University. Dr. Shelley was subsequently appointed a postdoctoral research associate at Purdue University, and then moved to the University of Münster as an Alexander von Humbolt Post-Doctoral Fellow. Since 2014, Dr. Shelly has been a tenure-track Assistant Professor at Kent State University in Kent, Ohio.

Dr. Shelley's research program is build around developing, building and applying atmospheric pressure plasma-based mass spectroscopy instrumentation to provide rapid and in-depth characterizations of samples *in situ.*

New Faculty

George Slota

Assistant Professor of Computer Science

Dr. Slota earned his Bachelor of Science degree in Computer Engineering with minors in Math and Physics and his PhD in Computer Science and Engineering from Pennsylvania State University. He was a graduate intern in the Scalable Algorithms Department at Sandia National Laboratory allowing him to accelerate the growth of his research program.

Dr. Slota's research focuses on efficient solution of large-scale graph-theoretic problems on many-core architectures such as GPUs and Xeon Phis.

New Faculty

Yangyang Xu

Assistant Professor of Mathematical Sciences

Dr. Xu earned his Bachelor of Science degree in Computational Mathematics at Nanjing University, after which he earned a Masters degree in Operations Research at the Chinese Academy of Sciences and a Ph.D. in Applied Mathematics at Rice University. He comes to us from the University of Alabama.

Dr. Xu's research includes compressed sensing and low-rank matrix/tensor recovery, regularized matrix and tensor factorization and stochastic optimization.

New Faculty

Vassilis Zikas

Assistant Professor of Computer Science

Prior to joining Rensselaer, Dr. Zikas was senior research associate at the Cryptography and Information Security Group at ETH Zurich, and a Research Fellow of the Simons Institute at UC Berkeley. Previously, Dr. Zikas performed postdoctoral research at UCLA and the University of Maryland. Dr. Zikas received his Ph.D. at ETH Zurich. Since joining us in January of 2016, Dr. Zikas has focused his research in Cryptography, Computer Security, Game Theory and Distributed Computing.

SoS Faculty Searches in Progress

- **Network Science**
  Assistant Professor of Computer Science

- **Modeling & Simulation of Complex Systems**
  Assistant Professor of Mathematical Sciences
  (Signed offer returned! Prepare to welcome Yangyang Xu!)

- **Developmental Cellular and Neuroscience**
  Assistant Professor of Biological Sciences (offer in preparation)

- **Environmental Science**
  Associate or Full Professor of Earth & Environmental Science

- **D'Ambra Chair in Synthetic Medicinal Chemistry**
 Professor of Chemistry & Chemical Biology

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Constellation Searches in Progress

- **Biocomputation & Bioinformatics Constellation Chair**
(Full Professor and Chair, likely in Physics or Chemistry)

- **Tissue Engineering and Regenerative Medicine Constellation Chairs**
(Three Full Professors, one likely in SoS)

- **Future Chips Constellation Chairs (cMDIS Constellation)**
(Three Full Professors, one likely in Physics)

- **Cognitive Immersive Systems Laboratory Constellation**
(Full Professor, likely in Computer Science as Ricketts Chair)

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IWHP: Science and The Rensselaer IDEA

- **Data INCITE Lab** now in operation!
- New Ph.D. students funded through IDEA projects (HASS, SoE, SoS)

- **DATUM-Ed**, **INCITE** and the *"Data Dexterity"* Initiatives are up and running!

- Senior faculty leadership team in place
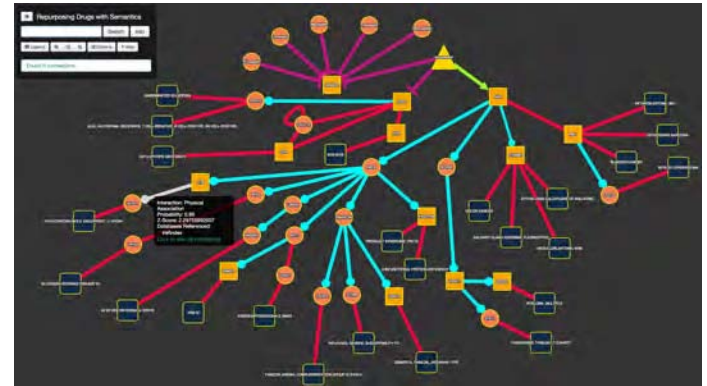
IDEA Research

- Healthcare analytics *"Data to Action in Human Health"* (Gates Foundation, CDPHP, AMC, MVP)

- Agent-based dialog project

- Natural language (Army Research Laboratory)

- "Biome" Informatics

- Materials Ontology and *"MGI@RPI"* Informatics

- Neuromorphic Computing

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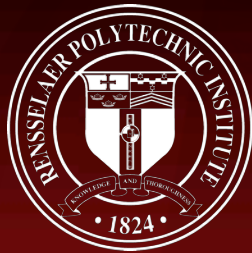# …and now, straight from the Troy Building…

The School of Science FY18 Performance Plan

(as presented to the President and the Cabinet)

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FY18 Science Performance Plan

"Scientia pro Vitae"

Curt Breneman

Dean, School of Science

Focus on Diversity & Inclusion

- Strengthen URM student recruiting pipelines
  - Develop new HBCU partners for graduate recruiting
  - Work with Admissions on URM recruiting & yield events
- Mandate candidate pool diversity (faculty and staff)
  - Actively seek opportunities to make URM hires

Focus on Success & Retention

- Promote a climate of inclusion and support
  - Connect Freshman URM students with medium/large research labs
- Expand unconscious bias training across the School
- Develop early-warning metrics for SoS retention
  - Create metrics for faculty, staff and student retention risk
  - Focus on Sophomore -> Junior retention in FY18
  - Define and meet measurable retention goals for FY18-FY20

art_x

We will – expand and explore linkages

- Create a sponsored "Math & Music" symposium series together with HASS

- Launch a "Chemistry of Art, and Art of Chemistry" forensics track
  - Explore Biology and Computer Science forensic linkages

- Pilot three discipline-specific *"creativity intensive"* courses across the School of Science curriculum
  - Emphasize process over product; allow students to develop a tolerance for risk and ambiguity; enhance problem solving

- Beta-test the Digital Passport *Venue* system in collaboration with DotCIO, HASS, and Student Life
  - Develop and evaluate 2-3 sets of Art_X class activities and Student Life events to be supported by *Venue*

Summer Arch

We will – create new learning opportunities

- Provide unique experiences for rising Juniors as they pivot from an "inward" focus to an "outward" focus
  - Pilot 3-4 Junior Summer enrichment activities, for example:
    - *A Summer of RCOS – software to make the world better*
    - *Applied Data Analytics – wind energy up close and personal*
    - *Environmental Bioscience – Lake George and beyond (+SoE & Lally)*
    - *Forensics in the Field – NY State Police Lab and real "CSI"*

- Develop new *external* opportunities for rising Juniors around intellectual exploration, co-ops and internships during their "away semester"
  - Build new student research opportunities at home and abroad
  - Identify and expand internship and co-op options that span Fall or Spring and potentially extend into the following Summer

Student Engagement

We will – create new learning opportunities

- Support the Teaching and Learning Collaboratory
  - Train faculty in using "Best Practices" teaching methods
  - Involve more SoS leaders in the TLC steering committee
- Expand PrizeLab and support the Challenge Studio
  - Build on student-driven, faculty advised prize success
  - Identify and enhance data analytics-related links to the Studio
- Implement "Data Dexterity" across the School of Science
  - Data INCITE Lab (AE217 design was inspired by the TLC!)
- Strengthen and enhance cyber-enabled blended learning courses and bridge programs
  - Build Calculus and Physics Bridges; focus on URM success
- Grow the Sci MBA program in collaboration with Lally
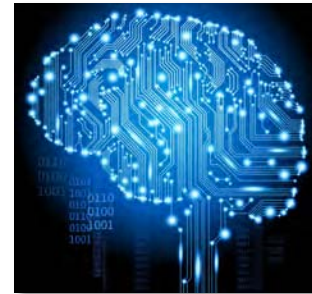
We will – imagine, discover and innovate

- Work with the Provost and VPR to fill Constellations

- Stimulate and enable new multi-PI proposal success

- Build and enhance intellectual bridges between IDEA, Jefferson Project, CISL, TERM, BCBI and CSE

- Build success in Neuroscience and Condensed Matter Physics

- Apply *"Data to Action"* theme for IDEA*,* cMDIS *and* CISL on:
    - Energy Analytics
    - Healthcare Analytics
    - Environmental Platform ("The Jefferson Project and Beyond")
        - Global Challenge in scope, including other Schools, *e.g.* SoE & Lally
    - Materials at the Nanoscale ("MGI@RPI")

We will – enable and motivate

- Focus on faculty research productivity & Ph.Ds
  - Enhance Assistant Professor "Dual Mentoring" system
  - Enable early career faculty to achieve "Fast First Funding"
    - 100% of second-year SoS Assistant Professors have external funding
- Continue upward trend in School of Science research awards
  - Currently up 40% relative to FY16; increased expenditures to follow
- Identify and nurture the next generation of Research Leaders
  - Stimulate mentorship relationships between existing and emerging leaders
- Encourage, empower and assign senior faculty with fewer research activities to increase their focus on effective teaching
  - Deploy each senior faculty member according to their strengths

We will – prioritize the Student Experience = CLASS

- Work with Student Life to develop 3-4 meaningful, developmentally-appropriate opportunities for interactions with Science faculty outside the classroom
    - Implement a periodic "Dean's Office Hour" for open discussion
    - Develop plans for informal student groups to meet with faculty in Residence Hall common areas
    - Support the Faculty Fellows Program
- Focus on program and course assessment
- Launch Science HUB and CCPD Science career advising
- Work with the Provost and OGE to support Graduate CLASS

We will – recruit and retain the best people

- Seek *Teaching Fellows, Lecturers and Professors of Practice to* address teaching needs for FY18 & FY19 in IWHP areas with pedagogical gaps:
  - Astronomy (Physics, Applied Physics and Astronomy)
  - Environmental Chemistry (Earth & Environmental Sciences)
  - Environmental Biology (Biological Sciences)
  - AI and Cognitive Computing (Computer Science)
  - Computational Non-linear Optimization (Mathematical Sciences)
  - Inorganic Chemistry (Chemistry & Chemical Biology)
- Fill open endowed chairs and Constellation positions
  - TERM, Future Chips (cMDIS), CISL & BCBI Constellations
- Emphasize retention and success among current T&TT faculty
  - Develop tools to reward, encourage and enable successful faculty
  - Work with HR to ensure compensation equity

We will – develop new sources of philanthropy

- Work with Institute Advancement and SCER to maximize donor engagement with IWHPs and Signature Thrusts, including the Summer Arch

- Identify, steward and position transformational gift prospects for the President; close smaller gifts (<$1M)

- Expand the Science Leadership Council membership with associated recurrent and major gift commitments

We will – develop new revenue streams

- Maximize research awards and expenditures, especially new center grants supporting multiple Ph.D. students

- Prioritize creation, development and monetization of IP

- Work with other Portfolios to identify online education, certificates and professional Masters program options

We will – ensure fairness and compliance

- Review and update School policies in consultation with the Provost

- Focus on lab safety and personal security

- Handle student complaints in a timely and confidential manner

- Strengthen student commitment to academic integrity and "honoring the code"

"We, Rensselaer Science & ITWS Students, recognize our fields as important and learned professions, requiring the highest standards of honesty and integrity. For Science & ITWS professionals to have a direct and vital impact on the quality of life for all people, we must dedicate ourselves to the advancement of public health, safety, and welfare.

As Rensselaer students, we accept the responsibility to perform under a standard of professional behavior, adhering to the highest principles of ethical conduct and academic integrity."

Discussion

Thanks for participating!

**For more School of Science updates,
follow us on social media or on the web:**

@RPIScience
Science.rpi.edu