Student Accomplishments

Recent external student presentations

Plant & Animal Genome Meeting, San Diego CA

- Ben Fowler, Sex Markers in Two Sebastes Rockfishes (Poster)
- Andrea Waksmunski, Automated de novo Transcriptome Analysis of Eukaryotic Organisms (Poster)

Experimental Biology 2015 (Boston, MA):


- Adam Lescallette, Vincent Knecht, and Daniel R. Dries. “Student reflections from an upper level Problem-Based Learning biochemistry course.” (Poster)

- Siham Zniber and Daniel R. Dries. “How the translation of a 19th century medical text enhances the professional development of a senior undergraduate.” (Poster)

American Society for Biochemistry and Molecular Biology. ASBMB, Boston MA


- Jess Scales presented a poster “RTT105 in Ty1 retrotransposition: a role in virus-like particle (VLP) assembly?” at the ASBMB annual meeting in Boston.

Attention Students!

Want to get started in genomics research? Sign up for our genomics certificate program. It is an excellent gateway into our research programs!

Follow the notice of interest link at: www.juniata.edu/projects/hhmi and e-mail Dr. Buonaccorsi at buonaccorsi@juniata.edu
Student Accomplishments (cont)
8th Annual Pittsburgh Bacterial Meeting at Duquesne University

- David Toole. Temporal Assessment of Impacts of Unconventional Natural Gas Extraction on Microbial Communities in Headwater Stream Ecosystems in Northwestern PA
- David Toole. Identification of a Shell-Degrading Family of Cyanobacteria Using the High-throughput Sequencing of the 16S rRNA Gene

Recent external student awards

- Nikea Ulrich: Goldwater Scholarship Honorable Mention
- Katie Shelledy: Hollings Scholarship
- Jess Scales and Jonathon Partsch: undergraduate travel awards for ASBMB annual meeting in Boston.
- Abigail Rosenberger and Nikea Ulrich: undergraduate travel awards to the American Society for Microbiology
- NSF-Graduate Research Fellowship Program (GRFP) Honorable Mention; Steve Strutt ‘13, UC Berkeley

Upcoming external summer research internships

NSF-Research experience for undergraduates (NSF-REU)

- Ben Fowler: William and Mary School of Marine Science
- Katie Shelledy Marquette U.
- Dallis Hamlin, U. Notre Dame
- Katie Douds, Texas A&M U.

HHMI-Extraordinary research opportunity (HHMI-EXROP)

- Abigail Rosenberger, John’s Hopkins University
- Daniella Rodriguez, John’s Hopkins University

Department of Energy, Science undergraduate laboratory internship


Student graduate school entries/jobs

Andrea Waksmunski: Admitted to PhD program at Case Western Reserve University

Ricky Burgan will begin working for Eurofins Lancaster Laboratories as an Associate Scientist in the Biochemistry Department

Jonathon Partsch will be attending Jefferson Medical School
Faculty Accomplishments

Recent Juniata Research Publications resulting from or significantly informed by HHMI sponsored programs, AY 2013/14 (*Student Authors)


Recent presentations by HHMI-supported faculty (*Undergraduate student)

- Lamendella G: "Systems Biology Approach to Fracking for Environmental Monitoring" 10th annual Department of Energy Joint Genome Institute, Genomics of Energy and the Environment Meeting (presentation with Justin Wright ’14.)
- Daniel R. Dries. “From Sir Walter Raleigh to the mongoose: A Problem-Based Learning (PBL) course in biochemistry centered around curare.” (Poster) Experimental Biology, Boston MA

Attention Faculty!

Faculty course development applications related to the Certificate in Genomics, Ethics, and Society are due by the 15th of each month. Please see the link on our web page (www.juniata.edu/projects/hhmi) for the application and details.

Upcoming Event!

May 20: Joint Meeting on Bioinformatics. Look for announcements from Kim Roth and Jim Roney!
Faculty Accomplishments (cont)

- J Roney. Science, Medicine, and the End(s) of Life in Tolstoy’s “Ivan Ilyich”. Association of core text and courses. Plymouth, MA.

Teaching Tolstoy’s “Death of Ivan Ilyich” in a core course on medicine and literature allows bioethics, literature, and philosophy to pose essential questions to each other: How can science, medicine, and literature help us balance curing disease and caring for people? How should we apply ethical rules in particular life situations? How can we balance professional expertise, faith, and moral empathy in education and life?

Genomics Research Program Description

The Research Program provides funding for massively-parallel sequencing data, supplies and summer stipends. Student research is a high-impact educational practice that helps students develop expertise, confidence, and effective communication skills. The research program gives students opportunities to participate in genomics research with faculty and to take leadership in directing genomics research projects.

Five funded summer research projects for 2015 will each involve two students. Interdisciplinary research projects were given special encouragement this year.

- Dan Dries: Use of RNAseq to identify transcriptional changes related to the gamma-secretase complex in mouse.
- Kim Roth/Gina Lamendella: Modeling the degradation potential of groundwater microbial communities using multi-omics data sets.
- Jill Keeney: The yeast orphan gene project: Finding a place for ORFans to GO.
- Peter Rothstein/Jill Keeney: Knowledge and attitudes towards infant and prenatal genetic testing in four rural health care settings.
- Jason Chan: RNAseq analysis of sphingolipid pathways in *C. elegans*. 
### Certificate in Genomics, Ethics and Society

#### Certificate Overview

The Genomics Certificate guides students to explore both the science and the broader ethical, legal and social implications (ELSI) surrounding progress and discoveries in the field of genomics. All students pursuing a genomics certificate must take four core courses:

1. Genomics, Ethics and Society, a team-taught course that lays the foundations for interdisciplinary work on the ethical and social dimensions of genomics:
2. A course covering basic molecular biology, genetics, and genomics
3. At least three credits of statistics:
4. One course covering informatics and analysis of large data sets

Students also select three elective courses related to ELSI genomic themes:
- Social History of Medicine
- Medieval Medicine: Health and Disease in the Middle Ages
- Doctors, Medicine and Russian Literature
- Science and Human Values
- Moral Judgment
- Leadership in the 21st Century/Executive Leadership

The certificate is further described at [www.juniata.edu/projects/hhmi](http://www.juniata.edu/projects/hhmi). Students interested in learning more about the certificate program: Please click on this Notice of Interest Link: ([https://docs.google.com/forms/d/1spUBGCCAv89_Ull2_tPNXDe7eWralMnbl-nk3QUoJDe/viewform](https://docs.google.com/forms/d/1spUBGCCAv89_Ull2_tPNXDe7eWralMnbl-nk3QUoJDe/viewform)), and contact Dr. Buonaccorsi (buonaccorsi@juniata.edu) directly.

#### Recent News

Six seniors plan to graduate with the genomics certificate this May! We wish these young scholars many successes in the years to come.

- Molley Stapleton
- Emily Fox
- Vincent Knecht
- Jonathon Partsch
- Cassy Wisyanski
- Andrea Waksmunski

The administrative board is working on collecting and evaluating their genomics portfolios to assess learning relative to the certificate learning objectives.
Recent News

A conference on “Teaching the Ethical, Legal and Social Implications (ELSI) of Genomics and Medicine to College Students: Best Practices,” was held at Juniata on Saturday January 31st 2015, organized by Juniata ELSI learning community members Belle Tuten and Jill Keeney. Attended by 25 participants from 8 institutions, talk and poster presentations stimulated great conversations. Keynote speaker Katie Kendig, Missouri Western State University, presented on “Knowing by doing: experiential learning approaches to ELSI in synthetic biology, biotechnology, and history and philosophy of science”. Discussion and conversations continued after lunch with a round table on “Teaching Ethics” led by Jim Roney and discussion on the formation of an undergraduate ELSI community led by Jill Keeney. We hope to be able to follow with continued development of a broader ELSI community among undergraduate programs.

The ELSI learning community focused discussions this semester on how to assess student learning in the certificate through the GCAT-SEEK essay, discussion of the book, “Life Out of Sequence: A Data-Driven History of Bioinformatics,” by Hallam Stevens, and how to encourage undergraduate research in the humanities. Deliberations on the latter topic are detailed below:

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**ELSI Overview**

The Ethical, Legal and Societal Impacts (ELSI) Learning Community, led by Jim Roney, is a group of faculty that crosses academic divisions. The group held 2-week summer workshops in 2013 and 2104 to develop courses and modules for the genomics certificate by reading and discussing materials from various fields to acquire a common understanding of how the different research methods in the certificate can be integrated into a liberal arts education. Additionally, the group meets twice a month during the academic year to discuss articles or topics that address the impact of genomics beyond the scientific discoveries. The Learning Community also sponsors campus wide forums as an opportunity for learning and debate, addressing topics such as the ethics of genetic testing, legal aspects of gene patents, the film depiction of genetic science, and the scientific, cultural, and political context of the Ebola virus outbreak. The ELSI Learning Community has established close ties with local physicians and psychologists and included them in discussions of clinical issues and the training of future scientists and physicians.

Faculty members involved in the ELSI group include: Jim Roney (Russian and International Studies), Kathy Baughman (ABE), Marlene Burkhardt (ABE), Dan Dries (Chemistry), Philip Dunwoody (Psychology), Kathy Westcott (Psychology), Andrew Fletcher (General Education), Jill Keeney (Biology), Wade Roberts (Philosophy), Peter Rothstein (History), David Sowell (History), and Belle Tuten (History).
ELSII Faculty Learning Community (cont)

Deliberations on encouraging undergraduate research in the humanities

We decided it was very important to avoid value judgments when trying to distinguish between the social sciences and the humanities; the two represent different types of knowledge and different methods rather than one valid and one invalid or one superior method. We then had a detailed discussion of the problems we seem to face in getting undergraduate research in branches of the humanities such as literature, language, religion, and philosophy.

We identified the following problems:

- It is hard to involve students in conceptual work, such as philosophy research.
- It is hard for students to develop the linguistic ability they need to do research in other languages or even in the professional languages of the humanities.
- There is a statistical issue. The natural sciences start with a large number of students, only a few of whom go on to do research. The humanities start with so many fewer students that even if the percentage was the same, they might not have any qualified students in a given field in a given year.
- Faculty require better departmental and administrative support to develop their own research if they are to include students in it. If faculty do not have a research or professional development profile of their own, it is hard to include students in their work. Developing such a profile requires time and support to do work without students as well as work with students.
- Science students join the lab teams of science faculty; humanities students expect to be able to work on their own individually chosen topics.

We discussed the following solutions:

- Consciously asking the question of what knowledge and abilities students would need to get involved in ELSI research in the humanities and then structuring our curriculum to provide students with them.
- Changing assignments and class activities to place more emphasis on problem-based learning and the development of research abilities.
- Course-based undergraduate research on ELSI in the humanities as a stimulus to future summer projects
- Trying to find a way to deal with our difficulties in sequencing courses in the humanities, especially in regard to ELSI courses
- Adding a capstone course in ELSI that would involve undergraduate research
- Using students to do literature searches and annotate the lists they compile
- Mentoring students as they move toward producing a senior thesis/project and presenting their work at LAS; consider whether faculty should develop research projects students join rather than allowing students to work on any topic of their choosing
Thinking about what we are already doing to determine whether some of it actually is undergraduate research and then find means to refine and develop such work

Consider developing seminars or other topical courses that would allow us to involve students in interdisciplinary work in ELSI

Writing additional grants to obtain professional development funds for students and faculty

**Integrative Sciences Faculty Learning Community (ISLC)**

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<th>ISLC Description</th>
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<td>The IS Faculty Learning community is led by Kim Roth. Meeting topics include genomics research topics of faculty, tools useful for genomics research, and support for instructors preparing or teaching genomics certificate courses.</td>
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Membership/distribution list for ISLC: Vince Buonaccorsi, Jill Keeney, Kimberly Roth, Cathy Stenson, Jay Hosler, Deb Kirchhoff-Glazier, Jerry Kruse, Jim Borgardt, Jeff Demarest, Mark Peterson, Gina Lamendella, Matt Beaky, Neil Pelkey, Dan Dries, Chris Grant, Chris Walls, Jason Chan, Randy Bennett, Jamie White, Norris Muth, Loren Rhodes.

The Integrated Science Learning Community met 4 times in fall 2014 and will meet 4 times in spring 2015. We also met jointly with the ELSI group in the fall and will conduct a joint workshop with ELSI in May. The ISLC has discussed tools for doing genomics research, interdisciplinary research projects, and data science/bioinformatics.

In December 2014 the ELSI and IS learning communities had their first joint meeting. We discussed:

- The need for an institutional home to support sustained interdisciplinary work in ethics
- The need for sustained cooperation across fields
- The need for more research opportunities and greater cooperation in our research
- The need for greater cooperation with local medical institutions
- The possibility of focusing on the impacts of big data

In the spring semester we discussed what data science and bioinformatics are and how/whether we could/should implement them at Juniata. This discussion was guided after examining a series of relevant resources. Vince Buonaccorsi and Uma Ramakrishnan presented a paper on wildlife population genomics of coyotes in the context of their interdisciplinary joint research project on effects of coyote/wolf/dog introgressive hybridization on coyote evolution and ecology. A joint meeting focusing on differing perspectives about the science and impacts of bioinformatics and data science is planned for May.
Integrative Sciences Faculty Learning Community (cont)

Data science and bioinformatics are fields in which undergraduate programs are just being developed. We looked at a few undergraduate majors/certificates in both fields at other schools and noticed that Juniata had courses in many of the topics listed, but in particular was missing courses in machine learning and upper level statistics. The possibility of doing data science or bioinformatics at Juniata was discussed. Logistics issues, such as offering it as a track within existing POEs, were discussed, along with how to take advantage of Juniata’s strength in ethics in a potential program.

GCAT-SEEK Genomics Consortium

**GCAT-SEEK Description**

The Genome Consortium for Active Teaching Using Next-Generation Sequencing (GCAT-SEEK) is a network of schools that brings together the necessary resources to support genomic projects with undergraduates. The network is funded by grants from HHMI and the National Science Foundation. The network has i) facilitated group runs and/or negotiated group pricing with a number of sequencing centers, ii) connected liberal arts professors to experts in various fields, iii) increased access to shared computer resources for faculty and undergraduate-students across the country, iv) conducted summer faculty development workshops which include funding for participant research projects, and v) developed and published genomics teaching resources. The network has grown to over 230 members from over 160 schools, providing workshop training for Juniata faculty and students, and leadership opportunities for students. GCAT-SEEK lab manuals are integrated into statistics and bioinformatics classes in the HHMI certificate, and are used to guide independent research students.

Recent News

Two workshops are planned for summer 2015, one at Juniata and one at Morgan State University. We will support 24 faculty teams and sequencing projects this summer. We are working on project details and on editing our manuals for June.

1. Original consortium as of 2011
2. Consortium as of 2015

**Miscellaneous**
The internal HHMI board continues to meet other week during the regular academic period. We submitted our second annual report to NSF on Feb 1. The postdoctoral search yielded several qualified candidates. Several offers were made and one candidate accepted the position but left after working two weeks upon receiving news of earning a tenure-track position.