Message from the Director

2013 was the most eventful and exciting year ever for the field of informatics at the University of Iowa, and this coming year promises to bring even more dramatic progress.

In October, Provost Barry Butler and Vice President for Research and Economic Development Dan Reed announced the University of Iowa Informatics Initiative (UI3). As part of the initiative, the University has committed a new cluster hire in informatics, which will add twenty new faculty members in core computing and key application areas, such as biomedical informatics and geoinformatics. Plans are under way for a center or institute in informatics, which will house the research, teaching and service components of the new initiative. IGPI will continue to play a central role in the emerging informatics landscape at Iowa. Track the progress of the initiative at informatics.uiowa.edu.

Meanwhile, IGPI has added a third degree program in Bioinformatics and Computational Biology offering PhD and Master’s degrees. The new program has received immediate interest from students, including a new group of five MS students in the Helen Johnson Fellowship Program from the Carver College of Medicine.

In the news, affiliated faculty member Kang Zhao, working with Information Science student Xi Wang, received extensive media coverage for their advances in recommendation systems for online dating. Zhao & Wang’s algorithm combines information about a person’s taste (what type of person they approach) and their attractiveness (how many of those people reciprocate that contact), resulting in a dramatic increase in reciprocal connections.

The first group of IGPI PhD graduates found themselves in demand on the academic job market, securing positions at the University of Minnesota, University of North Carolina – Greenville, SUNY – Oswego, and University of Washington – Tacoma.

The rise of “big data” and the ubiquity of computing have contributed to the critical importance of informatics in all fields of human endeavor. These changes are reshaping the academic landscape at the University of Iowa.

Informatics is transforming the world. Visit us online to find out how it can transform yours!
Informatics News

New Degree Programs in Bioinformatics

The possible uses of bioinformatics technology in the microbiology field are immense. In response to the escalating needs for trained professionals in computational analysis of biological systems and for more intense bioinformatics training for microbiology students, the University of Iowa has expanded its program offerings effective Spring 2014 with the following:

• **MS and PhD Degree Programs**

  Both MS and PhD degree objectives are now offered in the Bioinformatics subtrack of the Interdisciplinary Graduate Program in Informatics, in addition to the existing Graduate Certificate in Bioinformatics.

• **Microbiology Specialty in Bioinformatics**

  A specialty within the Microbiology PhD program has been added for those who wish to specialize with a focus on bioinformatics. Available through the Center for Bioinformatics and Computational Biology (CBCB) at the University of Iowa’s College of Medicine, this training program will incorporate elements of research in the computational sciences with those in the life sciences.

  These degree programs provide real-world experience and cross-disciplinary training in biology, computer science and information technology, preparing graduates to play pivotal roles in today’s cutting-edge life science, biotechnology and pharmaceutical industries. The expanded offerings enable graduates to secure a solid foundation of core knowledge, needed professional skills and connections with leading industry employers. Combined with the flexibility to specialize in areas of interest, graduates of these U of I programs can achieve a firm foothold in this competitive and lucrative field.

**Informatics Certificates**

**Now Open to Non-Degree Students**

No longer limited to those students currently enrolled in an existing graduate degree program, IGPI is pleased to announce the inclusion of non-degree applicants for consideration in the Bioinformatics and Computational Biology and Information Science Graduate Certificate program, beginning with the Spring 2014 term. This path allows working professionals the opportunity to take advantage of the program's specialized training in scientific computation, which is now one of the most increasingly crucial tools for discovery in all professional fields.

Students earning a Graduate Certificate gain a working knowledge of numerical analysis, software systems, statistics and data modeling to enhance their areas of professional expertise and to analyze and interpret massive digital data sets now routinely collected in the sciences, in engineering and in the humanities.

The Bioinformatics and Computational Biology and Information Science subtrack joins Health Informatics in opening up the non-degree certificate options.
The Graduate Informatics Society (GISo) is a student-run organization affiliated with the Interdisciplinary Graduate Program in Informatics (IGPI) at the University of Iowa. Dedicated to connecting students in the program together from their various interdisciplinary fields, GISo provides a space in which to compare notes on research with peers, collaborate on innovative tools and resources, and to solicit feedback on ideas and presentations.

Charisse Madlock-Brown, president of GISo, is currently a student in the PhD program for Health Informatics. An enthusiastic proponent of the field of informatics, she notes that the program is new enough that it allows students the freedom to make their marks and set the standards for those who will follow. She is quick to point out that self-motivation, a willingness to explore uncharted territory and a certain creativity in regard to conducting research are useful attributes, as well as the ability to accept criticism.

“Criticism is valuable; use it to make whatever you’re doing better,” she advises. As an example, she describes how papers that are initially rejected are often, ultimately, cited more once they are published, because the researcher has taken the time to rethink and rework it. She also advocates keeping your real interests in focus, and being assertive about getting the advisor you need for your chosen area of specialty.

Informatics is faced with the challenges of being interdisciplinary in a world that is still largely disciplinary, however, it is also being recognized as critically necessary for bringing meaningful analysis to data-driven companies worldwide. For informatics students, the prospect of being able to combine disparate areas of talent, interest and strength into a personalized curriculum is compelling. The experience of developing research with a solid focus on real-world outcomes can be parlayed into a career in a field hungry for people who are skilled at the analysis, assessment and manipulation of data needed to resolve problems in the information age.

GISo offers the opportunity for students to maximize their time in the program – whether in Bioinformatics, Geoinformatics, Health Informatics or Information Science – and to weave connections for future success.

For more information visit the GISo website at www.informatics.grad.uiowa.edu/giso.
Bioinformatics

The interdisciplinary field of bioinformatics draws from the expertise of areas including computer science, mathematics and engineering to develop, apply and improve on computational methods for processing biological data. Software tools, including databases, information systems and applications, are used in conjunction with experiments and analysis to maximize the creation of useful knowledge and discovery in the field.

Terry Braun

The director of the Bioinformatics subtrack of IGPI is Terry Braun, Associate Professor in Biomedical Engineering and Ophthalmology & Visual Sciences. Braun also serves as a researcher for the Center for Bioinformatics & Computational Biology, and as director for the Coordinated Laboratory for Computational Genomics.

To view Professor Braun’s profile, visit informatics.grad.uiowa.edu. View Dr. Braun’s College of Medicine Curriculum Vitae at engineering.uiowa.edu and his lab webpage at genome.uiowa.edu/clcg.html.

To view other faculty in the Bioinformatics subtrack and related allied disciplines, visit informatics.grad.uiowa.edu/bioinformatics/faculty.

Geoinformatics

Geoinformatics is becoming more and more relevant in today's world. The use of spatial geographic data is growing, and information is being collected in enormous quantities, from handheld mobile GPS devices to vast satellite imaging, and used by individuals, agencies and companies across the globe.

The field of geoinformatics involves the collection, processing, analysis and display of these large spatial data sets for a broad array of applications, including those in:

- Health research
- Housing and urban analysis
- Environmental concerns

- Physical systems
- Movement ecology
- Digital humanities

The University of Iowa’s graduate program educates students in the most advanced techniques for geographic information processing, as well as providing opportunities for involvement in cutting-edge research projects in new and emerging technologies. Graduates are well-prepared for leading positions in industry or academics.

David Bennett

The director of the Geoinformatics subtrack of the Interdisciplinary Graduate Program in Informatics is David Bennett, Professor and Department Chair of Geographical and Sustainability Sciences.

Fired with interest in his current research at the University of Iowa, Bennett has been involved in a myriad of projects during his tenure, from remote sensing time-series ecosystem analyses to applications that track hurricanes or disease fields to modeling elk migratory behavior in Yellowstone. “My research interests lie at the intersection of technology, policy, and science. While my work
is squarely focused on geographic information science (GIScience), I am interested in the processes and the effects of environmental decision-making. Much of my research is done in the context of multidisciplinary teams and designed to understand the social and environmental tradeoffs associated with alternative policies.”

Visit Bennett’s faculty page for more on his teaching, students, research interests, funding and publications: [http://clas.uiowa.edu/geography/people/dave-bennett](http://clas.uiowa.edu/geography/people/dave-bennett).

**Health Informatics**

Never has there been a better time to enter the field of health informatics. As current health systems are reinvented as digital health systems, there is a critical need for professionals who are trained in methods of managing, analyzing and evaluating the massive amounts of health information generated in this age of “data smog.” From helping clinicians deliver care, to making sure doctor and patient needs are met in real-time, health informaticists hold important roles in the health industry – especially as health care organizations go through seismic shifts in digitizing and securing patient information and health data.

The University of Iowa’s program in Health Informatics prepares students for careers in which they will help lead information-enabled organizations in improving usability of data, human-computer interaction, and user interfaces. In the process, they will be positively affecting the health of individuals and populations and, in the process, revolutionizing health care. Emerging from this premier research institution graduates are extremely well prepared with the skills and vision to garner the use of innovative technology that is responsive to present and future public health needs worldwide.

**Nick Street**

Director of both the Health Informatics subtrack and the Information Science subtrack of the Interdisciplinary Graduate Program in Informatics at the University of Iowa, Nick Street also serves as Professor and Director of Graduate Studies in the Department of Management Sciences. In addition, Street directs a student research group, SMIG, which performs theoretical, algorithmic and applied research in data mining and machine learning.

One conversation with Street is all it takes to learn he is a keen advocate of the deep value of informatics in the health field. He asserts that while today data is being collected at unprecedented levels, all of this data is not yet being effectively and positively utilized for the common good. We are on the verge of a time, however, when medicine can become completely personalized. Based on how health data is put together, and how imaging and survey data is maximized, a diagnoses can be built around an individual’s health history in combination with family health history, genetics information, environmental and other factors. Originally from the small town of Cambria, Iowa, Street, who is also a Henry B. Tippie Research Fellow, maintains he is living his professional dream of being a faculty member at the University of Iowa. His areas of expertise include:

- Data mining in healthcare
- Adverse drug effect detection
- Machine learning
- Mathematical programming
- Algorithmic finance
- Correlation of binary data
- Lifestyle options for heart patients

“... while today data is being collected at unprecedented levels, all of this data is not yet being effectively and positively utilized for the common good.”

Professor Nick Street
Alumni Spotlight

Chih-Lin Chi

After earning his PhD in Health Informatics in 2009, Chih-Lin Chi became a research associate in the Laboratory of Personalized Medicine at the Harvard Medical School. Dr. Chi is now an Assistant Professor at the University of Minnesota School of Nursing, and an active member of the Population Health and Systems Cooperative Unit.

Si-Chi Chin

Currently employed as a Research Associate for the Center for Web and Data Science at the University of Washington – Tacoma Institute of Technology, Dr. Chin earned her PhD in the Interdisciplinary Graduate Program in Informatics in May 2013. Her current work involves data analysis and the mining of clinical data. Her research concentrates on knowledge transfer pertinent to information retrieval.

Ray Hylock

Dr. Hylock is an Assistant Professor in the Health Services and Information Management department at East Carolina University. He recently presented an informatics research seminar topic, “Beyond Relational: A Database Architecture for Clinical Data Management” at the Duke Center for Health Informatics, discussing the design of storage engines used to house data culled from electronic health records; he proposed a database management system that utilizes new query methods, saving conversion time and storage space. He completed his PhD in Health Informatics in May 2013 at the University of Iowa.

Information Science

Information Science (IS) is the study of the acquisition, structuring, management, retrieval and dissemination of information in a variety of forms and contexts, and the distillation of that information into knowledge. In the last decade, IS has had a profound impact upon society, opening to the public broad avenues of access to information previously available only to those with advanced training. This unbridled access has lead to acute challenges in the management of data and information. An inherently multidisciplinary field with a strong computational nature, the IS program at the University of Iowa provides training in the application and development of computational methods addressing a variety of fundamental problems in the science of information. The IS subtrack of IGPI offers PhD and MS degrees, as well as Certificates for both graduate degree-seeking and non-degree students.

Our curriculum is individualized to allow for various specializations in IS such as:
- Imaging
- Text retrieval
- Machine learning
- Algorithms
- Data mining and curation
- Classification schemas
- Management and evaluation
- Knowledge representation
- Community informatics

Nick Street is the Director of the Information Science subtrack. Read his profile under the Health Informatics section on the previous page.