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**REQUEST FOR A PROGRAM NAME CHANGE AT IOWA STATE UNIVERSITY:
FROM MASTER OF SCIENCE AND Ph.D. PROGRAMS IN GENETICS TO MASTER OF
SCIENCE AND Ph.D. PROGRAMS IN GENETICS AND GENOMICS**

Action Requested: Consider recommending approval of the request by Iowa State University to change the name of the Master of Science Program and the Ph.D. Program in Genetics to the Master of Science Program and Ph.D. Program in Genetics and Genomics in the Colleges of Agriculture and Life Sciences, Liberal Arts and Sciences, Veterinary Medicine, and Human Sciences.

Executive Summary: The proposed program name change will better reflect the current curriculum and future research of the faculty. This request has been reviewed by the Board Office and the Council of Provosts and is recommended for approval. This request addresses the Board of Regents Strategic Plan priority to pursue “educational excellence and impact” and Goal #8 – “Iowa’s public universities and special schools shall be increasingly efficient and effective.”

Background:

- ◇ **Description of programs.** The interdisciplinary programs include 90 faculty members, most of whom are involved in genetics and genomics research and 90 students pursuing graduate training (Ph.D. and M.S.) in genetics. Faculty members are housed in 14 departments and four colleges. The programs train students in a broad curriculum. Students select courses from four core areas – Transmission Genetics; Molecular Genetics; Genomics, Bioinformatics and Statistical Genetics; and Evolution, Population and Quantitative Genetics. Students receive training in bioethics and scientific ethics, learn about genetics faculty research on campus, and participate in an annual workshop that introduces them to speakers on a specific genetics topic through the speaker’s publications and discussions with the speaker in small groups. Students present posters and their research at national and international symposia.

The Genetics graduate program has awarded approximately 200 degrees since it was established in 1992. Alumni are working in industry and academia. The two largest employers of graduate students are Monsanto and Pioneer DuPont who are both doing genomics on a large scale. Out of 175 graduates, Monsanto and Pioneer DuPont employed 22 graduates in 2013.

- ◇ **Reason for proposed name change.** The following will be accomplished by the proposed name change:
 - ⇒ Better reflect the current curriculum and enhance the recruitment of students.
 - ⇒ Reflect the current and future research of the Genetics faculty, which includes genomics.
 - ⇒ Update the program and major to best compete for applicants in a rapidly changing field.
 - ⇒ More accurately describe the program to graduates so they can compete in the field of genetics and genomics in the future.

In 2013, approximately 35% of the U.S. applicants indicated an interest in pursuing a genomics project during their graduate studies or already had research experience in genomics. It is likely that this interest level will increase; therefore, the proposed name change will allow the university to better compete for students interested in genomics research. The proposed name change would highlight genomics strengths in research and coursework during student recruitment. In addition, departments that currently contribute to the Genetics program are considering new faculty hires in the areas of genomics research; the new hires who would join the Genetics program would want to hire graduate students entering the program.

- ◇ State of genetics and genomics. The study of inheritance began more than 10,000 years ago with the recognition by the first farmers that “like begets like,” and that selective breeding generates improved strains of plants and animals. This remains the foundation of modern agriculture. The success of selective breeding led to a desire to understand how inheritance worked; this has been a central area of study in the biological sciences ever since. This discipline has undergone major changes in response to new technologies and new discoveries. The modern science of genetics began with the discovery by Gregor Mendel of discrete units of inheritance (genes). During the past 100 years, there have been countless studies dedicated to the study of the structure, function, and mutation/evolution of genes.

Studies of important traits in agriculture revealed that such traits are controlled by large numbers of interacting genetic factors, indicating that many important processes are influenced by the composition of the entire genome, including non-gene elements. Analyzing such traits remained technically difficult until the advent of powerful technologies for DNA sequencing. These technologies led to studies determining the genomic DNA sequences of many different species, from bacteria to higher eukaryotes, including most major species of economic value. The rapid expansion of information about genomic DNA sequences has been accompanied by an expansion of the statistical tools needed to analyze large data sets of genomic information. The ability to determine and analyze genome sequences has led to a change in the nature of questions that are being asked about the structure, function, and mutation/evolution of whole genomes, or complex combinations of genetic elements. Such studies have been labeled “genomics” to reflect their focus.

A genome sequence is valuable for many areas of study; the integration of genomics and genetic data has provided an unprecedented view of the landscape and molecular components of complex genomes that are of value for understanding important aspects of many species, such as crops, livestock, and humans. ISU has a long history in the study of complex traits in crop and livestock species and in the statistical techniques for analysis of large sets of genetic/genomic data. Genetics faculty members are using new genomic tools and approaches. Many graduates are taking positions that require experience in using genomic approaches and analyzing data sets that span genomes. The university’s programs need to recognize this growing area of expertise.

In addition to generating rapid progress in understanding existing complex systems in genetics and answering questions in the study of populations, the tools of genomics are creating new fields of enquiry, including network and systems biology, that seek to predict the behavior of sets of genes/proteins. Combining genomic information with statistical/probabilistic modeling of biological systems is providing answers to important real-world problems. Funding agencies have responded to this shift by providing more

funding opportunities for teams of researchers who use interdisciplinary approaches to address large, practical issues. Many genomics-based proposals submitted by Genetics faculty have been successful; therefore, Genetics faculty see the need to train students in these new areas through integration with fundamental training in genetics.

- ◇ Comparable name at other institutions. This program is unique in the state of Iowa. There is no department or academic program at the University of Iowa that uses “genomics” in its name. Research service centers at SUI use genomics in their name and two research areas of faculty members in the Biomedical Engineering graduate program are listed as “Computational Genomics” and “Genomics, Bioinformatics, and Systems Biology.”

There are a number of programs in the U.S. that have genetics/genomics in its program name, including Mount Sinai School of Medicine (Department of Genetics and Genomics); Wake Forest University (Molecular Genetics and Genomics Program); and University of California-Riverside (Graduate Program in Genetics, Genomics, and Bioinformatics).

- ◇ Consistency with accreditation requirements. This program is not accredited.
- ◇ Effect on program configuration. The number of credit hours will remain the same. The program already includes both genetics and genomics components in required, as well as optional, courses.
- ◇ Effect on students. Current students and those already admitted to the program will have the option of retaining the current program title (Genetics) or changing to the proposed name (Genetics and Genomics) without affecting their coursework. All students admitted after January 2015 will be admitted to the Genetics and Genomics Program.
- ◇ Effect on resources. Costs incurred by the proposed name change will not be necessary. Changes to the website will be done by existing personnel. Most correspondence is done through e-mail; current stationery will be used until it is gone; updated mailing materials will be ordered at that time.
- ◇ Proposed name consistent with College mission. The proposed name change is consistent with mission of the four Colleges to educate biologists in current scientific knowledge and to train them to conduct research to gain new knowledge of value to society.
- ◇ Date of implementation. The proposed program name change will become effective upon approval by the Board of Regents and will be included in the University’s General Catalog. The anticipated implementation date is Spring 2015.