Proposition 19-0607

Date Submitted: March 27, 2007

Sponsors: Chris Cramer (PES)
           James Botsford (BIOL)
           Tracy Sterling (EPPWS)

Proposed Committee Assignment: University Affairs

Assigned Committee: University Affairs

Title: A New Cross-College Undergraduate Bachelor of Science Degree in Genetics; offered jointly by the Departments of Biology (College of Arts and Sciences) and Plant and Environmental Sciences (College of Agriculture and Home Economics).

Proposal:

The Departments of Biology and Plant and Environmental Sciences are requesting Faculty Senate approval to start a new Bachelor of Science degree in “Genetics” with a major in “Genetics and Biotechnology”.

Proposed New Bachelor Degree: Bachelor of Science in Genetics.
Proposed New Major: Genetics and Biotechnology.

History/Rationale:

The field of Genetics has grown exponentially during the past decade with efforts completed to find most human genes, as well as, most genes of many other animals, plants, and microorganisms. Commercialization of the numerous applications of genetics, biotechnology, and genomics research is contributing to tremendous growth in the life sciences economic sector. This includes the food production, healthcare, computational biology, engineering, and environmental cleanup industries. Such major impacts, when coupled with recent National Science Foundation projections of a serious shortfall of U.S.-born scientists, will create strong job markets for Genetics undergraduates.

Given the rigor and specialized courses required for such a degree program, only institutions with comprehensive undergraduate programs in agricultural and biological sciences are able to offer a major in Genetics. A survey of 86 medium to large institutions (i.e. greater than 2000 enrolled undergraduates) in New Mexico, Arizona, Colorado, Oklahoma, Texas, and Utah identified only one institution, Texas A&M University, that has a well-established undergraduate degree program in Genetics. No undergraduate major or degree program in New Mexico focuses academic preparation specifically towards Genetics. Critical expertise exists at NMSU to develop a Genetics degree that will attract high academic achieving students and train them to apply genetic information in biological research.

The purpose of this degree is to provide a strong science-based curriculum that develops critical thinking and analysis skills, and provides “hands-on” training in multiple laboratory and computer-based techniques, in order to equip students to understand and solve technical
problems in genetics. Students will receive training in how biological systems function at the
subcellular, cellular, organism, and population levels. They will also experience fundamental
and advanced concepts of biochemistry, physiology, and classical and molecular genetics
including: DNA structure and function, gene regulation, protein synthesis, genome organization,
transmission genetics, linkage analysis, biotechnology, and the application of computer science
to handle large amounts of genetic information (e.g. bioinformatics). Given the controversial
nature of some genetic technologies, social ramifications and differing societal perspectives
related to contemporary issues in genetics, including risk assessment, will also be addressed.

Our goal is to attract new high academic achieving undergraduate students, from within New
Mexico and neighboring states, that would normally pursue studies at other institutions offering
a degree in Genetics, or other closely related rigorous disciplines. Enrollment data from other
institutions offering a Genetics major indicate that 0.5% to 1.5% of undergraduate students were
pursuing this degree program. Based on this information and 2004 NMSU enrollment statistics,
we expect 40 to 50 majors within two years after starting the program. These expectations are
supported by informal surveys conducted during Fall 2006 in the course, Principles of Genetics
(AGRO/ANSC/BIOL/HORT 305). The survey results indicated that, a significant number of
students (40 students) desired a curriculum that provides more in-depth training in genetics, and
that they would likely change their major to Genetics if it were available. Through additional
recruiting efforts we should be able to attract a minimum of 50 to 60 new students that would
otherwise not have attended NMSU.

Genetics undergraduates will be marketable in a variety of professions including: academic
research, technical support, teaching, agriculture, biology, biotechnology, medicine, and health
sciences. This degree also provides an excellent background for students wishing to enter
graduate school, medical school, and veterinary school.

Collaboration in Curriculum Development and Delivery

Curriculum requirements were developed based on nationally recognized undergraduate degree
programs in Genetics. Related departments and programs at NMSU were surveyed to
determine suitable courses already “in place” and course modifications/additions necessary for
such a major. A proposal was initially developed by faculty in the Plant and Environmental
Sciences (PES) Department. Several departments across campus were then contacted to
determine the feasibility of offering a Genetics degree and their interest in participating in
curriculum development. The Departments of Animal and Range Science,
Chemistry/Biochemistry (CHEM/BCHE), Biology (BIOL), and Entomology, Plant Pathology, and
Weed Science, agreed with the need for such a program. Subsequent discussion among the
departments reached the following consensus. This major should be offered as a Cross-
College degree program. The home departments for the major will be Plant and Environmental
Sciences in the College of Agriculture and Home Economics (CAHE), and the Biology
Department in the College of Arts and Sciences (A&S).

The initial proposal was then revised, in conjunction with faculty from PES, BIOL, and
CHEM/BCHE, with the objective to develop a Cross-College degree program between CAHE
and A&S. This plan of action was taken because these three departments will teach a majority
of the courses required for the proposed degree. The resulting curriculum has two components:
1) Basic Science Background of 40 credits, and 2) Genetics Core of 42 to 44 credits. All
University requirements including 42 General Education credits, and 54 upper division credits,
are accounted for in the 128 credit curriculum. This multidisciplinary curriculum will capitalize on
the combined expertise of more than 30 faculty from various departments at NMSU, and will provide the depth of coverage that students need to perform satisfactorily in their careers. The proposal was forwarded to the faculty of the three primary departments who approved the curriculum on or about November 6, 2006. The CAHE and A&S College Curriculum Committees approved the proposed curriculum with minor modifications on February 2 and 19, 2007, respectively.

Funding and Library Resources:

The Genetics core curriculum will draw primarily on existing courses from across campus. Three courses will be extensively modified, and 8 credits of newly developed courses are proposed. The FTE for the new courses will be generated through course consolidation, and changing the frequency of some course offerings with lower student enrollment. While no new FTE are strictly required to implement this degree, instructor support for one critical bioinformatics course is strongly recommended. Funding for two graduate teaching assistants (one in CHEM/BCHE and one in PES for bioinformatics related courses) is under consideration by the Graduate School. A response indicating whether or not additional resources are needed by the library to support this new degree has not yet been received. Laboratory and classroom facilities are deemed adequate. Additional funding for laboratory supplies will be provided by the two administrating departments of Biology and Plant and Environmental Sciences.

Administration:

The program will be jointly administered by the Plant & Environmental Sciences Department, College of Agriculture & Home Economics, and the Biology Department, College of Arts and Sciences. Given that the course prefix G EN for Geological Engineering is in use, it is anticipated that a new prefix (GENE) would be created and used to reference many core classes for the Genetics degree program.

Website for the formal proposal:

http://spectre.nmsu.edu/dept/welcome.html?t=pes

See featured items, Bachelor Genetics Proposal 2007