



## Background Information

Provide a detailed description of the proposed modification, including its nature and purpose and centrality to institutional mission. (1500 characters)

The proposed modification is a request to add a second delivery site for the Genetics program at Clemson University. This will establish the Center for Human Genetics (The Self Regional Hall, 114 Gregor Mendel Circle, Greenwood, SC 29646) as an instructional site for educating graduate students.

This approval will lead to a needed expansion of the Ph.D. Genetics program at Clemson University to include human genetics. The Genetics program plans to increase graduate enrollment by approximately ten students over the next three years (current enrollment is approximately 13 students). Graduates from the Genetics Ph.D. program are prepared in the research skills necessary to address emerging scientific challenges. The expansion of the Genetics Ph.D. program will address research challenges related to human genetics, with direct impacts on human health and public safety in South Carolina, the nation, and the world.

There will be no changes to the Genetics Ph.D. program curriculum or to the program assessment.

List the objectives of the modified program. (1500 characters)

The expansion of the Genetics Ph.D. program, facilitated through the new instructional site, will address research challenges related to human genetics, with direct impacts on human health and public safety in South Carolina, the nation, and the world. The objectives of the Center for Human Genetics are to advance primary genomic discovery, genetic based diagnostics, and epigenetic therapeutics through research and education.

More specifically, the addition of the Center for Human Genetics as an instructional site will allow us to:

- 1) Increase enrollment in the Genetics Ph.D. program by 10 students over the next 3 years (current enrollment approximately 13 students)
- 2) Expand research efforts (and published results) addressing the role of genetics in developmental disabilities, cancer, diabetes, rheumatoid arthritis, neurological diseases, and autoimmune diseases.
- 3) Increase the number of graduates from the Genetics Ph.D. program who are educated in the research skills necessary to address the link between genetics and human disease

### Assessment of Need

Provide an assessment of the need for the program modification for the institution, the state, the region, and beyond, if applicable. (1500 characters)

Recently published scientific research has demonstrated links between human genetic variants and many disease states including cancer, neuropsychiatric, neurodegenerative, autoimmune, and inflammatory diseases (e.g., diabetes, rheumatoid arthritis), and developmental disabilities. These research studies demonstrate the need for scientists trained in research methodologies necessary for the development of genetic-based diagnostics and epigenetic therapeutics, leading to reduced clinical trial costs and improved public safety. The Greenwood, SC site (Self Regional Hall) will be used to carry out this needed research, and educate Ph.D. students enrolled in the established Clemson University Genetics program.

Delivery of graduate courses at the new Greenwood, SC location will allow expansion of the existing graduate program in Genetics. Planned faculty hires for the center will significantly expand the breadth of the existing graduate program in Genetics by bringing new expertise in Human Genetics and will augment existing strengths in plant, microbial and animal genetics.

The modification (adding Self Regional Hall as an instructional site) will not impact the course curriculum or the assessment of the Clemson University Genetics Ph.D. program.

Will the proposed modification impact any existing programs and services at the institution?

Yes

No

If yes, explain. (1000 characters)

**List of Similar Programs in South Carolina**

Program Name	Institution	Similarities	Differences
Genetic Counseling, M.S.	USC	Both programs address the link between genetics and human disease. Consequently, both programs broadly have the potential to exploit knowledge about the relationship between genetic background and predisposition to disease.	Unlike the Clemson Genetics, Ph.D. degree program, the USC Genetic Counseling program is largely focused on clinical rather than foundational discovery research. In addition, due to the nature of M.S. vs. Ph.D. programs, the Genetic Counseling program is a more narrow/focused program compared with the Clemson Genetics, Ph.D. program.
Healthcare Genetics, Ph.D.	Clemson University	Both programs address the link between genetics and human disease. Consequently, both programs broadly have the potential to exploit knowledge about the relationship between genetic background and predisposition to disease.	Unlike the Clemson Genetics, Ph.D. degree program, the Clemson Healthcare Genetics Ph.D. program is largely focused on clinical rather than foundational discovery research.



### **Faculty**

Provide a brief explanation of any additional institutional changes in faculty and/or administrative assignment that may result from implementing the proposed program modification. (1000 characters)

The facility, located in Greenwood, SC, will house the Self Family Foundation Endowed Chair in human genetics and 4 additional tenured/tenure-track faculty. Faculty will teach at the site and have active research programs in the facility. The development of the Center and its faculty allow the department to expand its graduate student enrollment in genetics.

### **Resources**

Identify any new library/learning resources, new instructional equipment, and new facilities or modifications to existing facilities needed to support the modified program. (2000 characters)

The newly constructed Self Regional Hall, located at 114 Gregor Mendel Circle in Greenwood, SC and housing the Center for Human Genetics consists of:

- 5300 sq. ft. of research laboratory space
- 1595 sq. ft. of research support space
- 800 sq. ft. of research office space
- 600 sq. ft. of administrative support space
- 1050 sq. ft. of conference/seminar space and
- 750 sq. ft. of student office space.

The building is also equipped with a 10 GB (up and down) fiber optic internet connection and state-of-the-art teleconferencing capabilities. All of these resources will be available to graduate students for educational and research purposes.

Students will also have access to on-campus library resources (both online resources and the physical facility) as well as on-campus student support services, as with all students enrolled in the Genetics Ph.D. program.

No additional modifications to any facilities are necessary.

**Financial Support**

<b>Estimated New Costs by Year</b>						
<b>Category</b>	<b>1st</b>	<b>2nd</b>	<b>3rd</b>	<b>4th</b>	<b>5th</b>	<b>Total</b>
Program Administration						-
Faculty & Staff Salaries						-
Graduate Assistants	54,100	165,797	282,290	288,388	294,627	1,085,202
Equipment						-
Facilities	84	257	437	446	455	1,678
Supplies & Materials						-
Library Resources						-
Other Admin Cost						-
<b>Total</b>	<b>54,184</b>	<b>166,054</b>	<b>282,727</b>	<b>288,834</b>	<b>295,082</b>	<b>1,086,881</b>
<b>Sources of Financing</b>						
<b>Category</b>	<b>1st</b>	<b>2nd</b>	<b>3rd</b>	<b>4th</b>	<b>5th</b>	<b>Total</b>
Tuition Funding	3,916	11,748	19,580	19,580	19,580	74,404
Program-Specific Fees Diff+Lab						-
State Funding (i.e., Special State Appropriation)						-
Reallocation of Existing Funds	50,000	75,000	100,000	150,000	175,000	550,000
Federal Funding						-
Other Funding	-	-	75,270	154,108	236,649	466,026
<b>Total</b>	<b>53,916</b>	<b>86,748</b>	<b>194,850</b>	<b>323,688</b>	<b>431,229</b>	<b>1,090,430</b>
<b>Net Total (i.e., Estimated New Costs)</b>	<b>(268)</b>	<b>(79,306)</b>	<b>(87,877)</b>	<b>34,854</b>	<b>136,147</b>	<b>3,550</b>

\*Provide an explanation for these costs and sources of financing in the budget justification.

### Budget Justification

Provide a brief explanation for the other new costs and any special sources of financing (state funding, reallocation of existing funds, federal funding, or other funding) identified in the Financial Support table. (1000 characters)

**Note: Institutions need to complete this budget justification *only* if any other new costs, state funding, reallocation of existing funds, federal funding, or other funding are included in the Financial Support table.**

New Costs:

Graduate Assistants – Market-based stipends for the projected increase of 10 graduate assistants.

Sources of Financing:

Reallocation of Existing Funds – Reallocation of existing funds is from the College of Science. A portion of the \$1.5M of state appropriations for the Clemson Center for Human Genetics will be reallocated for this program.

Other Funding – Support of graduate stipends and assistantship differentials through increased grant activity.

### Evaluation and Assessment

Will any the proposed modification impact the way the program is evaluated and assessed?

Yes

No

If yes, explain. (1000 characters)

Will the proposed modification affect or result in program-specific accreditation?

Yes

No

If yes, explain; if the modification will result in the program seeking program-specific accreditation, provide the institution's plans to seek accreditation, including the expected timeline for accreditation. (500 characters)

Will the proposed modification affect or lead to licensure or certification?

Yes

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No

If yes, explain how the program will prepare students for licensure or certification. (500 characters)

### **Teacher or School Professional Preparation Programs**

Is the proposed modified program a teacher or school professional preparation program?

Yes

No

If yes, complete the following components.

Area of Certification

Attach a document addressing the South Carolina Department of Education Requirements and SPA or Other National Specialized and/or Professional Association Standards.

## **GENETICS Doctor of Philosophy**

The PhD degree in Genetics is administered by the Department of Genetics and Biochemistry. Research activities include biochemical, biometrical, molecular and population genetics, as well as bioinformatics, cytogenetics, and structural and functional genomics through arrangements with other participating disciplines.

### **Degree Requirements**

The PhD program requires GEN 8140, GEN 8100, BCHM 8140 and GEN 8050 during the student's first two years. In addition, PhD students are required to attend BCHM 8250 every semester they are enrolled, and must register for GEN 8510 in the semester of their dissertation defense. Students beyond their first year are required to do one oral presentation every year in GEN 8250.

A student's dissertation committee will determine whether the student should take courses in addition to the required courses. The University requires a total of 60 credit hours above the undergraduate degree or 30 above an earned master's degree.

A dissertation, consisting of 18 credits of doctoral research (GEN 9910), exclusive of any research credits earned at the master's level, is required of PhD students. Successful completion of written and oral comprehensive examinations will admit doctoral students to candidacy for the PhD degree.

**GEN 8140 Advanced Genetics 4 (4)** Topics include organization of DNA in prokaryotes and eukaryotes, mutation, extranuclear inheritance, recombination, control of gene activity, systems of mating, genes and development, genetics of behavior, population genetics, genetics and disease. Preq: Consent of instructor.

**GEN (BCHM) 8100 Principles of Molecular Biology 4 (4)** Introduction to the principles and techniques used to analyze prokaryotic and eukaryotic gene and genome structure, regulation of transcription initiation, regulation of protein synthesis and protein function. May also be offered as BCHM 8100. Preq: Consent of instructor.

**BCHM 8140 Advanced Biochemistry 4 (4)** Contemporary topics of functional and cellular aspects in biochemistry with particular focus on new observations, emerging ideas and important techniques. Preq: Consent of instructor.

**GEN (BCHM) 8050 Issues in Research 3(3)** Scientific writing, oral presentations and critical evaluation of them; legal and ethical issues associated with modern biochemical research. Science job hunting, time management and creativity for professional scientists are treated. May also be offered as BCHM 8050. Preq: Enrollment in the Genetics program.

**GEN (BCHM) 8250 Seminar I 1(1)** Special topics and original research in genetics reviewed by students, faculty and invited lecturers. May be repeated for credit. May also be offered as BCHM 8250. Preq: Enrollment in the Genetics program.

**GEN (BCHM) 8510 Seminar II 1(1)** Investigation of current topics in biochemistry. May be repeated for a maximum of ten credits. To be taken Pass/No Pass only. May also be offered as BCHM 8510. Preq: Enrollment in the Genetics Program.

**GEN 9910 Doctoral Dissertation Research 1-12** Doctoral Dissertation Research