The Biomedical Data Science and Informatics Joint Ph.D. Program

Clemson University and the Medical University of South Carolina

2025-26 Graduate Handbook

June 20, 2025

I. PROGRAM OVERVIEW

Introduction

The Biomedical Data Science and Informatics (BDSI) Ph.D. program is a joint Ph.D. program offered by Clemson University and the Medical University of South Carolina. The program brings together Clemson's strengths in computing, engineering, and public health and MUSC's expertise in biomedical sciences. Graduates will be prepared to manage and analyze large-scale data from a variety of sources such as electronic health records, biomedical texts, bio-sensor and imaging data, and omics data, and will possess the necessary skills for informatics careers in biology, medicine and public health, and research in prescriptive analytics. This interdisciplinary program is designed for full-time students with undergraduate or graduate computer science, math, engineering, or biomedical sciences backgrounds who wish to make a contribution to biomedical sciences and individual and societal health.

Specialized tracks will initially include precision medicine, population health, and clinical and translational informatics.

Precision medicine focuses on disease treatment and prevention and takes into account individual variability in genes, environment and lifestyle.

Population health addresses the health outcomes of a group of individuals, including the distribution of such outcomes within the group.

Clinical and translational informatics focuses on delivery of healthcare services and the translation of scientific discoveries from the bench to medical care at the bedside.

Additional tracks may be developed to meet emerging research interests and health needs.

The Ph.D. in Biomedical Data Science and Informatics is a research degree. Students will have the opportunity to work directly with faculty on research related to data science and informatics, and to actively engage in developing research proposals, conducting research, writing abstracts and manuscripts, and presenting findings.

II. GENERAL INFORMATION

University Policy

The information in this handbook is specific to the Biomedical Data Science and Informatics joint Ph.D. program. For university policy related to continuous enrollment and time to degree, along with academic grievances, integrity, and standards, and other university- and college-level policies, please visit the handbooks and bulletins for your home institution.

For BDSI students having MUSC as their home institution, please see the policies and guidelines posted to https://bulletin.musc.edu/university/policies-regulations.

For BDSI students having Clemson as their home institution, please see the Graduate School Handbook at https://www.clemson.edu/graduate/academics/policies-and-procedures.html.

Contacts

Taneisha Simpson, Graduate Services Coordinator for MUSC, simpst@musc.edu
Adam Rollins, Graduate Services Coordinator for Clemson, rollin7@clemson.edu
Dr. Alexander Alekseyenko, Program Coordinator for MUSC, alekseye@musc.edu
Dr. Aaron Masino, Program Coordinator for Clemson, amasino@clemson.edu

The Application Process

Applicants must possess a Bachelor's or Master's degree from an accredited institution, with backgrounds in biomedical or health sciences, computing, mathematics, statistics, engineering, or related disciplines. Coursework requirements include:

◦ One year of calculus
◦ One year of college biology
◦ Computer programming coursework or substantial industry experience

Courses in multivariate calculus, linear algebra, probability and statistics, and biostatistics are also recommended, as is relevant research experience. Additional application requirements can be found at https://www.clemson.edu/graduate/admissions/preparing-to-apply/supporting-materials.html. The program does not require GRE scores, but will accept GRE scores from applicants who wish to submit them. The program requires official TOEFL, IELTS, Duolingo, or PTE scores for international applicants without a US degree. For international applicants applying to MUSC, official TOEFL or IELTS scores are required. These scores should be sent directly from the exam's administrative offices.

Students selected from the initial review may be asked to interview with members of the admissions committee. These interviews may take place in person, or via synchronous video technology.

Students will have a designated "home institution"—either Clemson or MUSC—at which they will be physically located. Applicants should indicate a preference for their primary institution at the time of application. The admissions committee decides the home institution for each admitted student, taking this preference into consideration.

Admissions recommendations for the Ph.D. program are made by the joint BDSI Admissions Committee. Final admissions decisions rest with the Graduate Schools of Clemson University and the Medical University of South Carolina.

The deadline to apply to the BDSI Ph.D. program is January 15, although applicants are encouraged to submit early. The program admits during the Fall semester only.

Transfer Credits/Exemptions

With the approval of their Major Advisor and the BDSI Graduate Program Coordinator, students may transfer or exempt credits for recent graduate-level course work taken at other accredited institutions prior to admission into the BDSI Ph.D. program. Only those courses assessed to be equivalent (none from correspondence or research courses) and in which a grade of 3.0 or above was received will be acceptable for transfer or exemption to the program of study.

Financial Assistance

Full-time Ph.D. students on assistantships receive both a stipend and tuition support. Assistantships are awarded on a competitive basis to qualified students, both domestic and international. All qualified students are considered for assistantships when applications are processed.

Graduate students are eligible for an assistantship if they are enrolled in full-time graduate study, in good academic standing, and making satisfactory progress toward their degree. At Clemson, full-time study during the Fall and Spring semester is 9 credit hours per semester. Assistantships that occur over the summer also require summer enrollment. Full-time study during the summer semester is 6 credit hours. Full time study and funding for students at MUSC require a minimum of 15 credit hours per semester.

III. Degree Requirements

Prerequisite Coursework

Given that students will enter the program from a variety of disciplines, a student may already be well prepared in some of the topical areas and at the same time may lack recommended preparation in other areas. Accordingly, the graduate coordinator may waive or substitute a course to avoid duplication in an area in which a student has already demonstrated mastery, or may require remedial work in areas in which the student's preparation is lacking. Such remedial work will be in addition to the degree requirements of the program. Each student's program of study will be crafted in consultation with the graduate coordinator and the student's advisory committee to address the individual student's background and goals.

In cases where a student lacks pre-requisites for a required course, the student will be asked to complete both the pre-requisite coursework and the required course.

Required Coursework

Ph.D. students are required to take a minimum of 65 credit hours to complete the program. These hours are divided into 5 areas:

- Area I: Biomedical Informatics Foundations and Applications (15-16 hours)
- Area II: Computing/Math/Stats/Engineering (18 hours)
- Area III: Population Health, Health Systems, and Policy (5-6 hours)
- Area IV: Domain Biology/Medicine (3-4 hours)
- Area V: Lab rotations, seminars, doctoral research (24 hours)

Students are expected to take required seminar credit during their first four semesters. Any variation of this timeline requires the approval of the BDSI PhD program coordinators.

A detailed map of the program's curriculum can be found at https://www.clemson.edu/cecas/departments/computing/_documents/academics/bdsi-phd-curriculum.pdf/.

All BDSI Ph.D. students will take graduate courses from both institutions. Students will not be required to travel between campuses as courses will be made available to students both on- campus and via synchronous remote technology, although certain courses may require short 3- 5 day in-person sessions to open the semester. Courses are offered at the Clemson main campus, MUSC main campus, the University Center at Greenville, and the Zucker Family Graduate Education Center on CURI campus, North Charleston. Requests to take non-required courses at a student's non-home institution will be considered on a case-by-case basis.

For MUSC course descriptions, please visit https://bulletin.musc.edu/colleges-programs/graduate-studies/doctor-philosophy-biomedical-data-science-informatics.

For Clemson course descriptions, please visit https://catalog.clemson.edu/content.php?catoid=42&navoid=1360.

Once coursework is completed, students may maintain enrollment by registering for at least 1 credit hour of dissertation research. At MUSC, a student may register for 1 credit hour onlyonce.

Lab Rotations

Laboratory rotations are required for all BDSI Ph.D. students, and should occur at the student's home institution. A minimum of 2 rotations with two different laboratories are required unless a request for exemption has been approved by the BDSI PhD program coordinator at the student's home institution. Laboratory rotations are typically completed during the fall, spring, or subsequent summer of the student's first year. Three rotations with three different labs are encouraged to enrich the student's research experience and increase exposure to faculty members' research. Each rotation will typically last one semester, i.e., 16 weeks in the Spring and Fall semesters and 14 weeks in the summer.

Students are expected to spend at least 5 hours each week involved in rotation-related research activities. Minimally, lab rotations should require 3 hours of work per credit hour awarded, and should not exceed 10-15 hours per week.

All students participating in lab rotations during a given semester will be required to attend a preliminary session led by the Program Coordinators. These sessions will typically be scheduled before the semester begins, and will outline additional expectations regarding lab rotation objectives and deliverables.

Students entering the program with a Disseration Advisor already identified may be allowed to fulfill their rotation requirements by rotating with their Dissertation Advisor and a second member of their Disseration Advisory Commmittee. Requests of this type should be referred to the BDSI PhD program coordinator at the student's home institution.

Internships

The BDSI program recognizes the value of internships and industry experience. Students who are interested in completing an internship during the BDSI program (typically in summer following the first or second year of the program) should consult with their Advisor and the Program Director of their home institution. The internship experience should be related to the student's dissertation research and have application to the BDSI program curriculum. Prior to the internship, the student and advisor must submit a written statement via email to the Program Coordinator explaining how the internship is integral to the program, how it benefits the student's research, and outlining the learning objectives for the internship Once approved, the student may apply to the internship experience.

Internships should typically occur during the summer term. In rare circumstances, internships may take place during the fall or spring term. Generally speaking, doctoral students will not enroll full-time while on an internship, and any funding requiring full-time enrollment will be suspended until the student returns to full-time status.

At MUSC, approved, credit-bearing internships may fulfill the coursework requirements for Area V (Lab rotations, seminars, doctoral research, approvedinternships).

At Clemson, doctoral students will not enroll full-time while on an internship and will instead enroll in a zero-credit hour internship course coordinated by the University's Center for Career and Professional Development.

Remote Enrollment

Students are expected to enroll in-person at one of the two campuses until they have passed their qualifying exam and have begun their dissertation research. Any arrangements regarding the remote completion of a student's dissertation must be approved by the student's Dissertation Advisor and Program Coordinator. Student participating in the T15 SCBIDS4HEALTH training program will be expected to complete the traineeship from their campus of residence.

In person-attendance is expected for BDSI 700/8000 seminars, regardless of the student's campus. Synchronously connected classrooms will be provided.

Students on an F1 visa may have additional limitations regarding online coursework. Please speak to your Graduate Services Coordinator for additional detail.

Non-Student Employment

While non-student employment is allowed while enrolled in the program, students employed while enrolled will be expected to meet all expectations regarding attendance, research, and the program's timeline of academic milestons. Satisfactory performance related to these requirements will be assessed by the student's Dissertation Advisor, Program Coordinator, and Program, Graduate School, and College of Graduate Studies policies. At Clemson, students holding full-time employment are not eligible for assistantships. At MUSC, trainees may spend, on average, an additional 25% of their time (e.g., 10 hours per week) in part time research, teaching, or employment, as long as those activities do not interfere with or lengthen the duration of their training; activities beyond this allowance may make the student ineligible for assistantships, including reduced tuition.

Students employed or engaged in any employment and entrepreneurial activity not associated with their enrollment in the BDSI program will be expected to meet all Clemson University and Medical University of South Carolina conflict of interest criteria, including reporting conflicts of interest to their advisor, to remain eligible for enrollment in the program.

Orientation

In addition to the New Graduate Student and International Student orientations offered by the student's home institution, a program orientation for new students is held before Fall classes begin. During the program orientation, students are introduced to faculty and staff, and given detail about the program, its degree requirements, and current research projects. An orientation schedule will be shared with newly admitted students the summer before they matriculate into the program.

Town Hall

Each Spring, the program will host a town hall. Prior to the town hall, BDSI student representatives will reach out to currently enrolled students to request feedback on their time on the program. This is an opportunity for students to share questions and concerns, which will then be discussed in a public forum during the meeting.

During this process, students will also be given the opportunity to submit their concerns anonymously, and to request that specific concerns be addressed privately, in concert with the relevant offices.

Advising

Upon entering the program, students without a research advisor will be advised by the BDSI Graduate Program Coordinator for their home institution. During this period, the Graduate Program Coordinator will provide guidance regarding coursework and carry out selected academic functions related to program requirements. There is no relationship of funding between the student and the Graduate Program Coordinator during this time.

Students without a research advisor are encouraged to confer with their Graduate Program Coordinator before registering, as well as when adding or dropping courses

Plan of Study

Students will work with their Graduate Program Coordinator, Advisor, and Dissertation Committee to construct a plan of study that conforms to course requirements and takes into account both the student's prior preparation and intended area of research. Because the curriculum will be tailored to each student, the time needed to complete the degree will vary, but it is generally expected that students can complete the degree in five years or less.

For Clemson students, the plan of study is documented by filing a GS2-Plan of Study. Both the student's curriculum and dissertation committee may be revised as necessary by submitting a new GS2. Directions and filing deadlines for the GS2 can be found at https://www.clemson.edu/graduate/academics/plan-of-study.html.

At Clemson, a plan of study must be on file and signed by the student's dissertation committee prior to sitting for the qualifying exam.

Ph.D. Advanced Qualifying Exam

BDSI Ph.D. students must complete their qualifying exam by the end of their second year. The examination is offered once per year on a determined date and is prepared by the BDSI Student Progress Committee (typically in August). At Clemson, a student must submit their GS2-committee selection prior to sitting for their exam. The Student Progress Committee hosts an information session each Spring to provide details about the exam and answer student questions. The examination assesses competency in Areas I-IV as outlined in the BDSI curriculum. Questions for each of the four Areas are graded Pass/Fail.
There are three possible results for the exam:

1. The student receives a Pass in all four Areas, and therefore receives a PASS for the exam as a whole.
2. The student receives a Pass in two or fewer Areas, and therefore receives a FAIL for the exam as a whole.
3. The student receives a Pass in three Areas. The student must then take a follow-up examination, designed and administered by the Student Progress Committee within half a year of the original exam date, focusing specifically on the Area not passed. The overall

exam result will then become either PASS or FAIL depending on the outcome of the follow-up.

A student who receives a grade of FAIL for their first attempt must re-take the full qualifying exam the next year. For a student who receives a grade of FAIL on their second attempt, the BDSI executive committee will convene to confirm their dismissal from the program.

The purpose of doctoral qualifying exams is for students to demonstrate their competencies in key areas of their specific field. Students may consult online resources but are not allowed to use generative AI (e.g., ChatGPT) on any component of their qualifying exam.

Dissertation Advisory Committee

Students should select a Dissertation Advisor once they have selected an area of research by the end of the student's first year and prior to taking the advanced qualifying exam. While faculty at the student's non-home institution can co-chair a student's Dissertation Advisory Committee, all Dissertation Advisors must have their primary appointment in the student's home institution, and must be versed in biomedical data science and informatics. Additionally, the Dissertation Advisor must be a full member of either MUSC's Graduate Faculty of the College of Graduate Studies or Clemson's Graduate Faculty. Once the Dissertation Advisor is selected, the student should meet with the Advisor as often as needed to discuss course selection and research.

It is the responsibility of the Dissertation Advisor, in consultation with the student, to select a Dissertation Advisory Committee. The Dissertation Advisory Committee will guide the student's research and assume responsibility for the student's progress toward the degree.

Once established, students should attempt to meet formally with their entire committee at least once each semester. Students will work with their Dissertation Advisor and Dissertation Committee to prepare a Dissertation proposal (see next section). Selection of the student's dissertation committee members, including the Dissertation Advisor, requires the mutual consent of the student and the faculty selected. A student is free to dissolve an existing committee and form a new one at any time. Similarly, the Dissertation Advisor is free to step down, and committee members to leave the committee, if research interests change or relationships prove incompatible.

The selection of the Dissertation Committee
Students will be asked to select their dissertation committee prior to taking the advanced qualifying exam.

The composition of the Committee is as follows:
1. The committee must be composed of at least 5 members.
2. The student's Dissertation Advisor must serve as the committee chair and must come from the student's home institution.
3. At least 1 committee member must be from the student's non-home institution.
4. At least three committee members must be designated as BDSI core faculty.

At MUSC, both the Dissertation Advisor and the Dissertation Advisory Committee must be approved by the Graduate Training Director and the Department Chair.

At Clemson, the dissertation committee is selected and approved through the submission of the GS2-Committee Selection. Directions and filing deadlines for the GS2-Committee Selection can be found at https://www.clemson.edu/graduate/academics/plan-of-study.html.

Dissertation Proposal

After passing the advanced qualifying exam, students should prepare a Dissertation Proposal in consultation with their Dissertation Advisory Committee. Students should complete their proposal defense within 1 year of passing their qualifying exam. At MUSC, the topic chosen for the thesis or dissertation must be approved by the Department Chair for Public Health Sciences, with regard to the scope of research and the availability and utilization of departmental resources, as well as by the Dean of the College of Graduate Studies.

The Dissertation Proposal should identify either a methodological problem or a hypothesis to be tested, and describe the design and approach for addressing the proposed problem. This proposal should show evidence of creative integration of course material, as well as a sound understanding of the relevant literature, and should follow the format of a National Institute of Health (NIH) F31 grant proposal or National Science Foundation (NSF) grant application. An NIH-style proposal should include a specific aims page along with 6 pages explaining the proposal's significance, innovation, and approach, as well as an additional chapter of literature review of approximately 5,000 words. An NSF-style proposal should include a summary page along with 15 pages of project description. In the NSF-style proposal, the project description should include a thorough literature review. The list of references in the bibliography will not be included in any of the required page counts

Once completed, students should schedule their proposal defense at least one month prior to the presentation date and submit a written copy of their Dissertation Proposal to each member of their Dissertation Committee, allowing a minimum of two weeks prior to the proposal's presentation for review of the written document. At MUSC, the student also notifies the Public Health Sciences Department Chair and the Graduate Training Director of the date and submits a copy of the Dissertation Proposal to both.

Students should consult the Graduate Services Coordinator at their home institution for detail regarding the scheduling protocol and approval process for their Dissertation Proposal. On the date of the scheduled proposal, the student will present the Dissertation Proposal publicly, then defend the plan to their dissertation committee during a closed-door session. The public presentation should begin with a formal 45–50 minute presentation that outlines the student's research questions, their significance, and the methods proposed for their solution. The presentation is then followed by a question-and-answer session with the audience before the student completes the closed-door session with their Dissertation Committee.

If the proposal is not approved, it may be repeated an indefinite number of times, subject to the consent of the Committee. Upon successful completion of both the qualifying examination and the proposal defense, the Dissertation Advisory Committee recommends that the student be admitted to candidacy by their signatures on the Admission to Candidacy form at MUSC, and on the Research Approval Form at Clemson. A successful proposal must occur at least one year prior to the date of the student's final dissertation defense.

Ph.D. Dissertation

A dissertation based on original investigation is required of all Ph.D. students. The dissertation must give evidence of mature scholarship and critical judgment, demonstrate methodologic rigor indicating knowledge of research methods and techniques, and demonstrate the student's ability to carry out independent investigation.

Students should strive to present the results of their research at a national or international meeting of a professional society and to publish their results in a peer-reviewed professional journal prior to graduation. A distinguished publication record is considered by the academic community as the primary indicator of professional qualification in the sciences.

For formatting guidelines and submission protocol, students should consult the Graduate Services Coordinator at their home institution.

Oral Defense of Doctoral Dissertation

Each Ph.D. candidate is required to pass a final oral examination directed primarily to the defense of the dissertation. The defense of the dissertation is a rigorous examination intended to test the student's knowledge of the research covered in the dissertation, as well as their general knowledge of the related fields of study. The dissertation defense begins with a formal 45-50 minute public presentation describing the research methods and results, which is followed by questions from the audience. The candidate's Dissertation Committee then conducts an oral examination in a closed-door session to test the candidate's understanding of the area of research. Performance on this examination must receive approval of the student's Dissertation Committee before the student will be recommended for the Ph.D. degree.

Students should schedule their dissertation defense at least one month prior to the presentation date and submit a written copy of their dissertation to each member of their Dissertation Committee, allowing a minimum of two weeks prior to the dissertation defense for review of the written document

Students should consult the Graduate Services Coordinator at their home institution for detail regarding the scheduling protocol for their oral defense.

IV. Student Timeline

Milestone	Date
Selection of dissertation advisor	By the end of the student's 1st year
Selection of dissertation committee	By the end of the student's 2nd year and before sitting for the qualifying exam
Filing your plan of study	By the end of the student's 2nd year and before sitting for the qualifying exam. For Clemson students, this includes filing your GS2.
Completing the qualifying exam	By the end of the student's 2nd year, typically during the summer prior to the Fall semester of the student's 3rd year.
Defending your dissertation proposal	Within 1 year of passing the qualifying exam
Defending your dissertation	At least one year (but often longer) after passing the dissertation proposal.

Note that the BDSI program imposes no restrictions in terms of the maximum length of time until defense of one's dissertation, but that such restrictions may be imposed by the Graduate School at Clemson or the MUSC College of Graduate Studies.