

Handbook for PhD Students and Advisors

UNC Charlotte Ph.D. in Bioinformatics and Computational Biology

Welcome

You have chosen well. And now you're here.

UNC Charlotte's Department of Bioinformatics and Genomics is a unique research environment with a focus on high-impact research in both Biological and Computational Science. The department employs traditional faculty who are dedicated full-time to the Department and its programs, research faculty, full-time office and laboratory staff, and several part-time instructors. Faculty research is diverse and includes both wet lab and computational components, in areas including human genetic diversity, microbial evolution, crop plant genomics, infectious disease, and microbial community analysis. The Department has research programs in two locations – on the UNC Charlotte main campus, and an 18-mile drive away at the North Carolina Research Campus in Kannapolis. Opportunities for research rotations and assistantships are available in both locations. All classes and seminars take place on main campus.

In addition to the Ph.D. in Bioinformatics and Computational Biology, the Department offers a Master of Science program in Bioinformatics, two graduate Certificate programs, and an undergraduate Computer Science, Bioinformatics Concentration B.S. or B.A. and a Bioinformatics Minor. At any given time there are approximately 100 graduate students, postdoctoral researchers, and undergraduate majors associated with the department, and growth is on the horizon.

Your first job upon entering as a PhD student (besides doing well in your coursework) is to get to know the faculty and your fellow students. We do our best to facilitate that, with regularly scheduled seminars, social events, and an active student organization (The Bioinformatics Assembly of Students, BiAS).

Admissions

The Ph.D. in Bioinformatics and Computational Biology admits students on a competitive basis. You are welcome to contact individual faculty members prior to applying for admission, but all applicants will generally be considered by the Admissions Committee in two cycles. Applications for Fall semester must be received by January 1 and are considered in January with offers made by mid-February. Applications for Spring semester must be received by September 1, and are

considered in September, with offers made by mid-October. Applications received outside the normal application window may be considered once on-time applicants have been reviewed and decisioned, if there is a space available in the program. Review of late applications is not guaranteed.

Upon entering the program

When you are accepted to the program, you make a commitment to throw yourself 110% into learning to be an independent researcher. Consider study and research a full-time job and then some – you should not expect to be holding another job while you are seeking a Ph.D.

In return, the Department commits to you. We accepted you because we believe you can succeed, and as long as you successfully pass each of your milestones, we will ensure that you have research assistantship support at the Department's base level of \$24,668/12 months for the first five years of your Ph.D. The Graduate School offers tuition support for each Ph.D. student for up to five years (or three if you have already completed a Master's in the same discipline). *See additional information on GASP tuition award in Course Requirements section.

The department will assign you an academic advisor who will monitor your progress throughout your time in the department. Your academic advisor is separate from your research advisor, and will help you with course selection and make sure you complete your milestones on time.

Each Ph.D. student will have dedicated office space in one of the department's shared graduate office areas, as well as access to research computing hardware and research laboratories as needed to complete your research.

What are the expectations of Ph.D. research?

The Ph.D. in Bioinformatics and Computational Biology (BCB) is granted for *planning, execution, and defense of original research resulting in significant contributions to the discipline's body of knowledge*. The BCB Ph.D. program also requires didactic coursework to prepare the student for research success. Student progress is primarily assessed by: (a) satisfactory coursework performance, (b) the Qualifying Examination, (c) the Dissertation Proposal, and (d) the Dissertation Defense.

What does this really mean? You won't be going it completely alone. You should choose a research advisor whose research interests correspond well with yours. Then, within the scope of your advisor's research program, they will help you choose problems to focus on and gradually become more independent in your work. Your proposal defense is the point at which you will structure a program of research that can be completed within 2-3 years.

Coursework Requirements

The BCB program requires 72 credits in 8000-level BINF courses, or prior approved substitutions.

All students must complete two Research Rotations in the first year of the program; each provides a semester of faculty supervised research experience to supplement regular course offerings. Students must complete the Core Courses prior to taking the Qualifying Exam.

In consultation with their Academic Advisor, students should take an appropriate selection of the Gateway Courses in order to be prepared for the Core Courses. For example, an incoming student with a Computer Science background would be expected to take 8100 and 8101, but not 8111. Graduate Research Seminar is taken every semester until the semester following advancement to candidacy. Finally, many additional Elective Courses are available, but are not explicitly required.

Gateway Courses (as needed based on background)

- BINF 8100 Biological Basis of Bioinformatics (3)
- BINF 8101 Energy and Interaction in Biological Modeling (3)
- BINF 8111 Bioinformatics Programming I (3)

Core Courses

- BINF 8112 Bioinformatics Programming II (3)
- BINF 8200 Statistics for Bioinformatics (3)
- BINF 8201 Molecular Sequence Analysis (3)
- BINF 8202 Computational Structural Biology (3) or BINF 8203 Genomics (3)

Research Rotations

- BINF 8911 Research Rotation I (2)
- BINF 8912 Research Rotation II (2)

Graduate Research Seminar

- BINF 8600 Bioinformatics Seminar (1) *(Must be taken every semester until the semester following advancement to candidacy)*

Research Hours

- BINF 8991 Doctoral Dissertation Research (1-9) *(Must take a minimum of 18 hours)*

Responsible Conduct of Research

- GRAD 8302, GRAD 8240 or PHIL 8240
UNC Charlotte is committed to ensuring that doctoral students understand their obligations as researchers. All first-year doctoral students are required to enroll in one of the Responsible Conduct of Research courses. This course requirement prepares students for a range of research related issues.

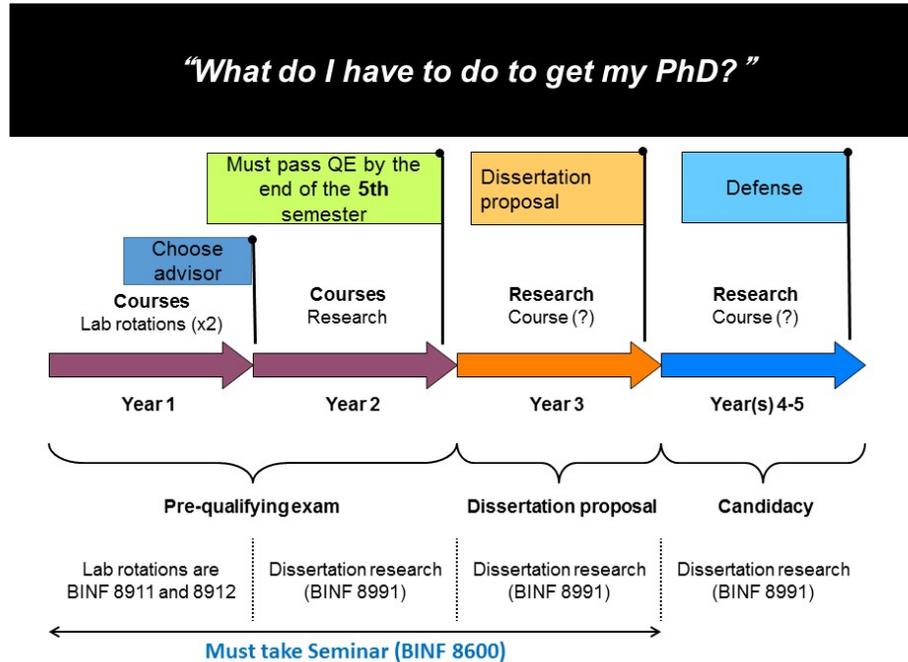
Electives

Any graduate level BINF prefix course may be taken as a pre-approved elective. Other courses may be taken with department approval.

Note about registering for GASP award students: 5th year students will need to enroll in GRAD 9800. GRAD 9800 is 3 credits, but allows student to maintain the

required full-time status. The following degree milestones must be completed: Qualifying Exam, Dissertation Committee and Proposal Defense.

“The big picture”: Research Timeline



Rotations and Selection of Research Advisor

In the first year of the program, students should register for one Research Rotation course (BINF 8911 or 8912) each semester. The research rotation is a student’s chance to get to know one of the research groups in the department in depth. The rotation advisor will assign the student an independent project. At the beginning of the semester, the student is expected to submit a research rotation project description; at the end of the semester, the student will have the opportunity to present a poster about the research conducted to their peers in the department. The student should also submit a written report describing the outcomes of the project, which the research rotation advisor should review and approve.

After two semesters of Research Rotation, by the start of their third semester in the program, each Ph.D. student must select a research advisor. The research advisor is the primary supervisor of the student’s research progress, and this step is crucial for all future research activities. Failure to identify and select a research advisor in a timely fashion will result in probationary status.

Qualifying Examination

Prior to defining a research topic, students are required to pass a Qualifying Examination to demonstrate proficiency in bioinformatics and computational

biology, as well as competence in fundamentals common to the field. The Qualifying Examination must be attempted for the first time before the student's 5th semester of residence.

Within one term after they have completed their research rotations and chosen their research advisor, each student will name a Qualifying Exam Committee. The committee should be constituted from Bioinformatics Department graduate faculty, and should consist of: 1) the student's research advisor, 2) one faculty member whose teaching focus is computational methods (e.g. programming, machine learning, statistics), 3) one faculty member whose teaching focus is computational applications (e.g. molecular sequence analysis, structural bioinformatics, genomics), and 4) one other faculty member of the student's choice. This committee need not be identical to the student's final Dissertation Committee.

The student will provide their qualifying exam committee with the written reports describing their rotation research. The Qualifying Exam Committee will prepare a written exam for the student. This exam will consist of questions that require the student to synthesize knowledge from the core courses, the literature relevant to their research in the program to date, and other elective coursework they may have completed. Students will have 24 hours to complete the written examination and may use relevant library materials, if properly cited.

The passing grade for both the written and oral sections is 75%. Students are allowed two attempts to pass written and oral sections of the Qualifying Exam. If some sections receive a passing grade, but not others, students have to re-take only the sections that they did not pass. Fall Qualifying exams are generally held early in January (after the end of fall term) and Spring Qualifying Exams are held in late May (after the end of spring term). A typical student entering the program in a Fall semester from an undergraduate degree program would take the Qualifying Exam in May of their second year in the program.

Students entering from a Master's or other graduate program, where transfer of credit results in early completion of Core Courses, will be directed by their Academic Advisor or the Program Director to take the Qualifying Exam at an earlier date.

Dissertation Proposal

Each student must present and successfully defend a Ph.D. Dissertation Research Proposal within two semesters after passing the Qualifying Examination. The Dissertation Proposal defense will be conducted by the student's Dissertation Committee, and will be open to faculty and students. The proposal must address a significant, original and substantive piece of research. The proposal must include sufficient preliminary data and a timeline such that the Dissertation Committee can assess its feasibility. Please note that students cannot apply for graduation the same term they complete their dissertation proposal.

Dissertation Committee

Part of preparing for your Proposal Defense is selecting a Dissertation Committee. Doctoral committees require four members. There must be three Bioinformatics faculty and one representative selected by the Graduate School on your committee. Typically, Bioinformatics students have an additional committee member from a collaborating department making their committee total five members. If you need to have a committee member, such as an off-campus collaborator, given a courtesy appointment in the department so they can serve on your committee, this can be arranged by your advisor. After passing the Dissertation Proposal, students must meet with their committee each year to review their progress. Failure to do so can result in having an Academic Hold on your account and prohibit you from registering.

Dissertation

Each student must complete a well-designed original research contribution, as agreed upon by the student and Dissertation Committee at the Dissertation Proposal. The Ph.D. Dissertation is a written document describing the research and its results, and their context in the sub-discipline. The Dissertation Defense is a public presentation of the findings of the research, with any novel methods that may have been developed to support the conclusions. The student must present the Dissertation and defend its findings publicly, and in a private session with the Dissertation Committee immediately thereafter.

Teaching Assistantship Requirement

Each student is required to hold a Teaching Assistant position for a minimum of one semester. This is an opportunity for students to get hands on experience in the classroom. Often times, the TA will have the opportunity to teach the lab section of a course in addition to other responsibilities the faculty member may have for their TA. The TA experience gives students who are interested in pursuing academia an opportunity to have classroom instruction practice. Students will discuss the TA requirement with their Academic Advisor and the BCB PhD Director.

Graduate Assistantship Employment Policies

The department commits to fund PhD students for up to 5 years (10 semesters) through a combination of departmental assistantship funding and grant-funded research assistantships. Additional semesters beyond the initial 5 years are contingent on the availability of research or fellowship funds awarded to the student or to their research advisor. Exceptions are at the discretion of the PhD Program Director.

The BCB program is a full-time PhD program, and to be eligible for department-funded assistantships, students must be in residence at the UNCC or NCRC campus, and must be available to perform teaching assistant duties as assigned by the Program Director. Research assistantship requirements may vary by arrangement with your advisor, and some remote work may be allowed, but in order for the PI to certify to their funding agency that students performed work as specified, the

majority of the work should be performed at a location on either the UNCC or NCRC campus.

Graduate Work Commitment

Formally, you are only allowed to work 20 hours a week at ANY JOB while you are full time enrolled in a Ph.D. program, and grad assistantships are written as 20-hour jobs. This university policy keeps us in compliance with state and federal policies. The other hours in your full time commitment are expected to be dedicated to coursework. But how to interpret that?

If you have a full-time or half-time outside job, you are not assistantship-eligible at all (and therefore also not eligible for GASP) because you are working more than 20 hours already.

If you are receiving a research GA and you are taking classes, then you are expected to devote about half of your full time commitment to research and the other half to doing well in your courses.

If you are receiving a Teaching GA and enrolled in research credits, then you are expected to devote about 20 hours to your teaching commitment and the rest of your full time commitment to research.

If you are receiving a research GA and enrolled in research credits, then you are supposed to be putting all your time both paid and academic into work on your research full time.

A summary of university policies on Graduate Assistantships is available on <http://graduateschool.uncc.edu/faculty-and-staff/policies-and-procedures#GA%20Policies>

Expectations for Work Performance

Students funded on departmental GTA lines are required to be in residence at the UNC Charlotte main campus or at NCRC. GTAs must be in regular attendance at the courses they are assigned to, except in cases of illness or emergency, or for research-related travel as arranged in advance with the faculty instructor of record.

Students funded on fellowships or graduate research assistantships must meet standards of regular attendance determined by their research advisor. When not involved actively in taking or teaching courses, PhD students must remain in regular contact with their research advisor, and attend regularly scheduled activities such as research group meetings and individual meetings.

Students are expected to limit personal travel to academic breaks and to be in attendance from the first day of each semester.

Expectations for Publication and Productivity

The BCB Ph.D. program does not have a formal requirement for X number of publications completed by the time of graduation, nor can a student be held back by the advisor solely because a publication is to be submitted or because a submitted publication is languishing in peer review.

That said, your future as a scientist hinges on productivity and publication. Your time spent fully dedicated to research, after the Qualifying Exam is passed, usually amounts to about 3-3.5 years. If you think of your dissertation goals in the way faculty think about planning research grants, you have 3 person-years of one full time employee (yourself) to complete the work you plan.

A reasonable goal to aim for is 1 quality first-author publication per person-year. Thinking about work in terms of publishable units, and planning around creating one publishable project for yourself per year which you then submit, will help you plan. That implies that by the time your Proposal Defense rolls around, you'll have one project where you've made significant progress and may even be close to having some work to publish.

No thesis committee will have a problem with a thesis made up of a strong background literature review plus three related, publishable pieces of your novel work – and it's very hard for a thesis committee to argue that papers that have made it through peer review by the time of your defense, do not represent sufficient contributions. Think strategically about publication from the beginning, and talk to your advisor frequently about what constitutes reasonable goals.

Advisors should expect to review theses and dissertation proposals in detail before they are brought to the committee, and to give advice. Faculty shouldn't hold a thesis defense if there's any question in their mind about whether their student can pass.

Conferences and Professional Societies

There are often opportunities to attend conferences in your field, present your work, and meet other scientists. You should be thinking strategically about this as well. Many conferences provide partial or complete travel support for students, so even if your advisor has not offered to send you to a conference, you can still find ways to get that conference paid for by submitting an abstract and applying for funds.

Your main professional society is the International Society for Computational Biology. ISCB <https://www.iscb.org/> In addition to hosting the long-running conference series, Intelligent Systems in Molecular Biology (ISMB) which occurs each summer, ISCB has many affiliated conferences listed on their website. <http://www.bioinformatics.org/> keeps track of many conferences and workshops as well as job opportunities in the field.

General Information

People you should know & what they do: Bioinformatics Faculty & Staff

Bioinformatics Department Chair: Dr. Lawrence Mays

Ph.D. Director & Academic Advisor: Dr. Cynthia Gibas,

Ph.D. Academic Advisor: Dr. Anthony Fodor

Graduate Program Coordinator: Lauren Slane. *Lauren is the go to for course registration permits, questions about your Degreeworks audit, information on Research Rotation Presentations and Qualifying Exam logistics, and any other questions you may have about the department and your program.*

Budget Coordinator: Trish Artis. *Trish can answer questions about your pay, timesheets, and requests to meet with the department chair.*

Administrative Support Associate: Jennifer Huffman. *Jennifer can answer questions about your student contracts, room reservation requests and provide information about the Seminar Series and Luncheons.*

Kannapolis Office Manager: Kim Davis. *Kim supports students who work/intern in a faculty lab in Kannapolis.*

Research Specialists: Dr. Cathy Moore & Karen Lopez

Faculty Members (located at UNC Charlotte)

Dr. Alex Dornburg

Dr. Anthony Fodor

Dr. Cynthia Gibas

Dr. Jun-tao Guo

Dr. Daniel Janies

Dr. Rebekah Rogers

Dr. Jessica Schlueter

Dr. Susan Sell

Dr. Zhengchang Su

Dr. Way Sung

Dr. Jun Wang

Dr. Jennifer Weller

Dr. Adam Whaley

Faculty Members (located at the NC Research Campus in Kannapolis)

Dr. Cory Brouwer

Dr. Elizabeth Cooper

Dr. Xiuxia Du
Dr. Jeremy Jay
Dr. Ann Loraine
Dr. Richard Allen White III
Dr. Robert Reid

Important web links

The Department of Bioinformatics and genomics
<http://bioinformatics.uncc.edu/>

The Bioinformatics Research Center
<http://brc.uncc.edu/>

The Graduate School
<http://graduateschool.uncc.edu/current-students>

Center for Graduate Life
<http://gradlife.uncc.edu/>

Degree Works
<http://degreeworks.uncc.edu>

Graduate Academic Petition
<https://gpetition.uncc.edu/login>

Where can I get help?

Center for Counseling and Psychological Services (CAPS)

Christine F. Price Center for Counseling and Psychological Services next to the Student Health Center, 704-687-0311

<https://caps.uncc.edu/>

Provides wellness-related programs and services to UNC Charlotte students. Services include individual and group counseling, consultation, outreach, and training. Offer a variety of resources that can be a good starting point to learn about various mental health issues.

Niner Central

380 Cone Center, 704-687-8622

<https://ninercentral.uncc.edu/>

Niner Central is a single location for you to go for services related to financial aid and billing, registration, transcripts, student accounts, academic records and more. The website combines these resources to help students navigate these services.

University Center for Academic Excellence

Colvard 2300, 704-687-7837

<http://ucae.uncc.edu/>

Tutoring available in such subjects as accounting, economics, mathematics, statistics, and more. Workshops offered in a wide variety of topics around personal success (organization, goal setting, maximizing your budget, etc.)

University Career Center

Atkins 150, 704-687-0795

<http://career.uncc.edu/about-us/contact-us>

Offers a wide range of resources for students and alumni including career advising, mock interviews, resumes/cover letters and networking.

Writing Resources Center

Cameron 125, 704-687-1899

<http://writing.uncc.edu/writing-resources-center>

Provides writing tutorials, presentation assistance, library assistance, and more.

Visit <https://graduateschool.uncc.edu/current-students/current-student-resources> for a list of current student resources in Academics, Support & Resources and Student Life.