

Department of Bioinformatics and Computational Biology College of Science

Student Handbook

Introduction

This handbook describes policies and procedures for the Certificate, M.S., and Ph.D. Bioinformatics and Computational Biology degrees offered by the College of Science (COS) in the Department of Bioinformatics and Computational Biology (BCB) at George Mason University. These programs, headquartered at the Prince William (PW) Campus, emphasize the role of computation in the biological, physical, mathematical, data and environmental sciences and address the growing national and regional demand for trained computational biologists. Additional information regarding curriculum and entrance requirements may be obtained through the BINF website at <http://www.binf.gmu.edu>.

Bioinformatics Academic Programs

- Bioinformatics and Computational Biology, Ph.D.
- Bioinformatics and Computational Biology, M.S.
- Certificate in Bioinformatics and Computational Biology

Admission to Bioinformatics Programs

There are several different types of admission status used in the Bioinformatics programs:

1. **Ph.D. Degree Status** - Full admission as a degree-seeking student in the doctoral program. The student may be enrolled either full-time or part-time.
2. **Provisional Ph.D. Status** - Provisional admission* into the doctoral program. The student may be enrolled either full-time or part-time.
3. **M.S. Degree Status** - Full admission as a degree-seeking student into the masters program. The student may be enrolled either full-time or part-time.
4. **Provisional M.S. Status** – Provisional admission* into the masters program. The student may be enrolled either full-time or part-time.
5. **Certificate Program** - Students may not enroll initially in any COS non degree, M.S., or Ph.D. program, then later transfer into this certificate program. The Certificate in Bioinformatics and Computational Biology charges students a differential tuition rate of \$100 per credit hour, which is added to the standard GMU graduate tuition rate (regardless of in or out of state status).
6. **Non-Degree Status** - Non-degree students are not admitted into the Bioinformatics program, but may take up to 12 credit hours of coursework which may be applied to a degree program at a later date if approved. Students who later choose to seek admission to a degree program must reapply for admission using the regular graduate application.

***Note:** Provisional admission into the Bioinformatics degree programs may be offered to students who have a GPA below 3.0 or who may require additional preparation in either Biology, Mathematics, or Computer Science. In such cases, the admissions letter will indicate courses that the student must take (usually before enrollment or during the first semester in the Ph.D. or M.S. program). Upon successful completion of the indicated courses with a minimum average GPA of 3.0, the student will be notified by letter that he/she has advanced from provisional status to degree status. This change in status will also be documented in the student's file. All credits of graduate level work earned during provisional status will be applied toward the degree program unless otherwise stated.

Student Orientation

Students are required to attend an orientation session with the program administration during the first week of the fall semester. This meeting provides incoming students with an overview of the Bioinformatics program and GMU resources, including computer facilities, library facilities, offices, and staff. Staff members from the BCB program will attend to answer questions. Topics include policies and procedures for the academic programs as well as for addressing student concerns. This meeting is held at the PW campus.

Temporary Advisor

The student will be assigned a temporary advisor upon acceptance into the program whether the student status is degree or provisional. The name and phone number of the temporary advisor are included in the acceptance letter. It is imperative that the temporary advisor be contacted as soon as possible to discuss enrollment in classes.

Computational Resources

The Department of Bioinformatics and Computational Biology maintains 3 computer labs for student use. Two of these labs, room 304B and 327, are also used as classrooms so students must be aware of course scheduling. Room 320 is available for student use at all times. Room 304B contains Apple eMacs. Room 327 contains PC's with both Linux and Windows installed on them. Room 320 has a combination of eMacs and Windows PC's. All three computer labs have laser printers maintained within the rooms.

Bioinformatics students are issued accounts and access to the student lab facilities. Other computing platforms may be available for research by graduate students. Both basic office software and bioinformatics specific software is available on the eMacs. Please contact our Computer Support Technician for a list of current and special request software. The Computer Support Technician can also set up your login computer account.

George Mason University provides a computer account to each student during the duration of their enrollment in an academic program. This account allows for email, news, web access, electronic search, and electronic library access. Please be sure to check your email frequently for updates on the program, or for general student announcements.

Library Resources

There is a special person at the Prince William Mercer Library who acts as a resource librarian for students in the Bioinformatics and Computational Biology Department. At this writing the person is Victoria Shelton. Contact Ms. Shelton for help researching or using library resources helpful to your degree program. Information at <http://library.gmu.edu/libinfo/pwl.html>

Student Research Day

There will be one day during each of the spring and fall semesters scheduled for student research presentations. Advanced and graduating students in the Ph.D. and M.S. programs will be selected to present their current research in a short research seminar. For M.S. students and for Ph.D. students in their 2nd year of study in the program, poster session presentations of research is recommended but is considered optional. We encourage all other fellow students to attend the presentations.

Student Bulletin Boards

Notices on colloquia, seminars and conferences are posted on the bulletin board in the hallway outside the administrative offices on the 3rd floor of the Occoquan Building. Please take time to visit these boards periodically, as available internships and upcoming GMU and outside events of interest to our students are frequently updated. There are additional boards available for our student posters. These posters reflect some of the current research areas of our graduate students for other students and faculty members to view at their leisure.

Student Research Labs

The Bioinformatics programs have designated student research labs that may be utilized by students doing research under the supervision of a specific faculty member. Although these labs are reserved for students, access must be approved by the advising faculty member involved with the specified student research project.

Notes on Registration

BINF courses numbered 798, 799, 998, 999, 703, 796, and 996 are referred to as "Individualized Sections" because the student meets individually with the instructor instead of going to a classroom. The registration for these is different from the registration for regular courses. To register you have to obtain a specialized Course Registration Number (CRN), and then the student registers him/herself online on PatriotWeb.

Masters students must have a Plan of Study and a Research Proposal Form on file--both completed and signed--in order to obtain a CRN from the program office for 798 or 799.

PhD students must have Forms 1 and 2 on file prior to obtaining a CRN from the program office for 998. Subsequent semesters of 998 require the Dissertation Proposal and Research

Progress form signed by the dissertation committee. (In unusual circumstances a PhD student may take one semester of 998 before submitting Form 2. In this instance the program office needs confirmation from the dissertation director that s/he approves this.)

PhD students must have Forms 3-A and 3-B on file and be admitted to candidacy prior to obtaining a CRN from the program office for 999. Subsequent semesters of 999 require the Dissertation Proposal and Research Progress form signed by the dissertation committee.

For lab rotations, BINF 703: Students should print out the Individualized Section Form from the Registrar's website, and have it signed by the "instructor" of the lab. They are to bring the signed form to the program office for a CRN. (If you cannot do this in person, you can submit a signed form via fax at 703.993.8976. If you cannot get the instructor's signature, an e-mail from him/her to you granting permission will suffice. Please forward that e-mail to the program office.)

For independent studies (796 or 996): Students are to print out the Individualized Section Form from the Registrar's website, and print out the independent study form from the BCB website. <http://www.binf.gmu.edu/resources.html> They should fill out both forms and have the instructor and their advisor sign. Students are to bring both forms to the program office a minimum of two weeks before the first day of the semester. The student services coordinator will get the dept. chair's signature on both forms. Then the coordinator will take the Ind. Section Form to the Registrar. The Registrar creates a CRN for the "course" and they manually register the student in that Section. The student services coordinator will send the student an e-mail to let him/her know when this happens.

More information on registering can be viewed here
<http://registrar.gmu.edu/students/registration/patriotweb.html>

Master's Program Procedures

- Before or during the first semester of study in the M.S. program, students are required to submit a **Plan of Study** form with tentative Plan of Study approved by an advisor. The M.S. Plan of Study will help the student create a program time line as well as help ensure all graduation course work requirements are met. A listing of the required courses for this degree are on the BCB website, and should be used as a guide to completing the Plan of Study.
- On the Plan of Study, the student will need to address whether s/he is interested in the project or the thesis option for completion of the M.S. research component. Project students will need 12 credits of electives. Thesis students will need 9 credits of electives. Any BINF course can be an elective. Courses in other disciplines can be approved as electives by the student's advisor. Students are to ensure they have the prerequisites for their electives.
- Students will need to decide which faculty member they would like to work with while doing their project or thesis research. If he/she agrees, this person will act as the

student's research advisor. The thesis option requires a committee. The master's thesis committee must be approved by the BCB Dept. chair who will designate a member of the faculty (usually the advisor) as the thesis committee chair. Thesis advisors will help students select members for the balance of the thesis committee. The committee will consist of at least three persons: two must be faculty members from the Bioinformatics program, and one faculty member may come from an academic unit outside the program. Students are to obtain advisors' and committee members' signatures on the Plan of Study. They should bring the form to the program office, and in the future submit updated and signed versions of the form if the Plan changes.

- Prior to the semester in which the student plans to conduct the research component, an M.S. **Research Proposal** form must be completed and signed by the research advisor. This form will then be submitted to the Program Director for review and final approval. If the thesis or project proposal is approved, the student may enroll in 3 to 6 credit hours of thesis research (BINF 799) or 3 credits of project research (BINF 798) at the beginning of the next semester. Graduate students must maintain continuous enrollment while writing and submitting a thesis.
- In the semester before students expect to graduate they are to file a Graduation Intent Form on the Registrar's website. The deadline to do this is listed on the Registrar's website every semester.
- Project students can expect to present the results of their research project in either poster or oral presentation form on Student Research Day.
- **It is imperative that the MS thesis student review the manuscript submission procedures provided by University Dissertation and Thesis Services**
<http://thesis.gmu.edu/index.html>
- Prior to submitting the manuscript, thesis students are to arrange a public defense of their thesis. See "Timelines for Manuscript" topic in this handbook.
- Thesis students are required to present hardbound copies of the thesis to the department and to the thesis director.

Doctoral Program Procedures

The Ph.D. program includes several important milestones that are documented in the student's file using program forms that are available online and in the Student Coordinator's office.

I. Proposed Coursework

The student should meet with the temporary advisor in his/her first semester to create a preliminary listing of anticipated coursework, which is documented on **Form #1**. Credits from a previous graduate program should be listed on this sheet. Credits taken in non-degree status at GMU should also be listed. This form is usually completed during the initial meeting with the temporary advisor.

II. Dissertation Director and Committee

- Once a student has completed over half of his/her required courses, which should be during the 2nd year of full time study, the student is to begin work with his/her temporary advisor to select a general area of scientific investigation and to identify possible dissertation directors. (Lab Rotations are a means of investigating the area of research they might wish to pursue.) The student begins to communicate with those faculty members and finally selects a faculty member who is willing to become the dissertation director.
- The dissertation director has the primary responsibility for leading the technical direction and content of the work of the student. The dissertation director must be a member of the *Bioinformatics and Computational Biology program faculty* or a *well-qualified scientist external to Mason*. In the latter case the person must also hold at least affiliate status within the department offering the degree. (Any non-Mason person serving as dissertation director who cannot be made affiliate faculty in the department must be approved as Graduate Faculty.) The appointment of the dissertation director must be approved by the COS dean.
- The purpose of the dissertation committee is to guide and direct the student to ensure that the student has the capability to conduct first-rate research and that the dissertation work is of publishable quality in the discipline or interdisciplinary fields of computational sciences and informatics. *A primary role of the committee is to test the student in accordance with the policies of the School.*
- The chair of the committee is a Bioinformatics program faculty member who is familiar with COS and university policies and procedures regarding the advancement of a student through the process leading to the doctorate. The chair is responsible for organizing all meetings of the committee and ensures that the proper process is being followed. The chair is to work closely with the dissertation director to ensure the consistency and the quality of the examinations and the dissertation work.
- A dissertation committee is formed by the student with the consent of the dissertation director, the Ph.D. Program Director, and the COS dean. The committee is to consist of a minimum of three members including the dissertation director and committee chair. The chair of the dissertation committee should be a full-time Mason faculty member, preferably from the BCB Dept. At least two members of the committee must be BCB program faculty members and at least one must have a Mason faculty appointment outside the BCB Dept. (The final membership must represent at least two disciplinary areas.) Beyond these three, additional experts or advisors from

outside Mason may serve on the committee with the consent of the Bioinformatics program faculty members on the committee. Once the committee is formed, the Bioinformatics Program **Form #2** listing the committee members must be completed and signed by all committee members, the program director, and the COS dean. Ideally, the committee is formed and approved before the student begins work on the dissertation proposal.

- A faculty member may leave the committee at any time. The replacement member must receive the consent of the rest of the dissertation committee members, the program director, and the COS dean. A new Form #2 must be completed and submitted for approval.

III. Dissertation Proposal

- Once a student has a fully approved dissertation committee and has completed most of the required courses (or is within a semester or two of taking the candidacy examination), the student may begin to register for BINF 998 Doctoral Dissertation Proposal to develop a proposal. (In exceptional cases the student may register for one semester of 998 before the committee is approved. In these cases the program office/student coordinator must receive confirmation from the dissertation director that permission for one semester of 998 has been granted.)
- When the dissertation director feels the student is ready, the student undergoes a dissertation proposal defense with the dissertation committee. The student is to supply a copy of the proposal to the committee members at least two weeks in advance of the attempted defense.

IV. Dissertation Proposal Defense

1. Students must prepare a Dissertation Proposal Defense that consists of a written proposal and an oral presentation to the committee. This proposal should include a statement of the problem, relevant background material, preliminary results and a proposed research plan with a time line.
2. The proposal should be given to the student's individual committee members **at least two weeks prior** to the scheduled proposal defense date. (A copy of the full proposal is also submitted with **Form #3-B**.)
3. Proposals should contain sufficient text, illustrations, tables, equations, and bibliography.
4. Proposals should discuss hardware/software issues including computational tools/techniques to be utilized in the research.
5. Proposals should include a clear set of goals, methods, and models, and a discussion of the expected results and their anticipated significance. The discussion should also include any limitations on the generality of these results.
6. The student will make a 15-20 minute presentation of the proposal to his/her Doctoral Dissertation Committee and other members of the academic community. There will then be a closed session for discussion of the proposal in which the

student will answer questions about the proposal and background material needed to successfully complete the proposal.

7. The proposal defense should be done within a year of passing the comprehensive exam.
8. Proposals must be approved by the dissertation director and the dissertation committee, and ultimately by the program director and COS Dean. These approvals are documented on **Form #3-B**.

V. Proposal and Dissertation Credits

- For students requesting ongoing 998 and 999 credit hours, it is required that they meet with their committee members prior to the start of each semester. The student must show satisfactory progress with his or her research in order to obtain a Section/CRN of 998 or 999 for the upcoming semester. If a committee exists, all members must agree on the student's satisfactory progress, or make a recommendation if the student is failing to do so. The **Dissertation Proposal and Research Progress** form should be completed by the student and his or her committee members during the progress review meeting. (This form must be signed and submitted to the BCB program office before being issued a Section/CRN to register for 998 or 999.) A student's failure to make satisfactory progress in his or her dissertation research for two consecutive semesters may result in termination from the program.

VI. Candidacy Examination

1. The Candidacy Examination consists of written, oral, and computational parts. All parts are mandatory.
2. It should determine mastery of fundamental knowledge and familiarity with current research in topics that contribute directly to the dissertation research area.
3. The computational exam will be given as an assessment exam during the first semester of enrollment into the program. Students who do poorly on this entrance exam will be required to take BINF 634 and/or BINF 734.
4. The written (comprehensive) exams will be given once a year in January. The exam schedule will be announced through the Student Services Coordinator. Students will be allowed two attempts to successfully pass the exams.
5. The comprehensive exam will be composed of six exam topics; 1) protein structure analysis, 2) research methods, 3) biological sequence analysis, 4) numerical methods for bioinformatics, 5) cellular and biochemical systems modeling, and 6) either genomics or Biophysics. Although there is no specific exam named, students should be knowledgeable in the area of molecular, cellular and biochemistry of the cell, since this information is essential for understanding the field of Bioinformatics.
6. The written exams will be administered and taken on campus and completed without collaboration, in an assigned room. The format of the written comprehensive exam may change from year to year. Details of the exam format will be announced to the students one month prior to the scheduled exam date.

7. Students must show competency on all six parts and a high degree of competency on four of the six parts of the written exams.
8. The computational assessment and the written exams are graded by faculty members of the BCB program. The student will be informed of their results in a timely manner.
9. The Dissertation Proposal Defense is considered the oral portion of the comprehensive exam. It will be scheduled and administered by the committee, and will include discussion of the student's proposed dissertation research
10. Students are allowed two attempts to successfully pass the Proposal Defense.

VII. Advancement to Candidacy

After the student completes all coursework, has passed all portions of the candidacy exam, has exhausted his/her work on the dissertation proposal, and has successfully defended the proposal to the dissertation committee, the information is to be documented on **Form #3-A** and **Form #3-B** and the approved dissertation proposal attached. These forms constitute the committee's recommendation that the student be advanced to candidacy.

After receipt in the program office, these forms plus the student's approved dissertation proposal are forwarded to the COS Dean's office for review. If the Dean grants candidacy the student will be notified via a mailed letter.

VIII. Dissertation Research Hours

- Once a student has reached candidacy s/he must be continuously enrolled in BINF 999, Doctoral Dissertation Research, while working on and completing the dissertation.
- To obtain a Section/CRN for subsequent semesters of 999 the student is to submit a signed Dissertation Proposal and Research Progress form to the program office **in the semester prior**.
- The total number of credits of BINF 998-999 for graduation purposes must be at least 24. (If the student's work on the proposal and dissertation takes more than 24 credits, only 24 can be credited toward the program requirements.) Having reached candidacy, the student must enroll in at least 3 hours of 999 each semester until three dissertation hours remain. Once the candidate has three or fewer hours remaining, s/he may register for one credit of 999 per semester. The candidate must take at least one credit of 999 in the semester of graduation.

IX. Doctoral Dissertation and Pre-Defense

1. A dissertation is a written piece of original thinking and independent performance that demonstrates the doctoral candidate's mastery of the subject matter, methodologies, and conceptual foundations in their chosen field of study.
2. Content should:
 - a. be relevant and current in the chosen area
 - b. demonstrate an understanding of research and development issues
 - c. demonstrate a mastery of computational tools or techniques
 - d. make a contribution through either new results or new techniques
 - e. be of publishable quality

Doctoral candidates are required to undergo a "pre-defense" of the dissertation at least 30 days prior to the formal, public defense. All committee members must attend. Arrangements for this are made between the candidate and the committee. Candidates are to provide their committee members a copy of the dissertation at least two weeks prior. If the committee is satisfied with the candidate's pre-defense, permission is granted to schedule a public defense. This permission is documented on **Form #4**.

See "Timelines for Manuscript" topic below.

X. *Public Dissertation Defense*

1. When the doctoral dissertation thesis is completed and a pre-defense has been successful, the candidate must arrange with his/her committee to schedule the final defense. Immediately after verifying a date with members of the committee, candidates are to contact the Student Coordinator for the Bioinformatics program to schedule a room and to make a public announcement.
2. The final dissertation manuscript must be given to the student's committee members for review at least two weeks before the final defense is scheduled.
3. **It is imperative that the doctoral candidate review the manuscript submission procedures provided by University Dissertation and Thesis Services**
<http://thesis.gmu.edu/index.html>
4. Candidate is to submit Defense of Doctoral Thesis **Form #5** to the BCB program office. It is required that bound copies of the dissertation are provided to the department, the dissertation director, and the committee chair (We suggest brown or rust color with dissertation title and candidate's name on the spine of the book.). It is recommended but not required that bound copies of the dissertation are provided to the remaining committee members.

See “Timelines for Manuscript” topic below.

Timelines for Manuscript

The final thesis or dissertation manuscript is to be submitted to the Fenwick Library on the Fairfax campus.

For MS and PhD students who plan to defend and submit their thesis or dissertation in any given semester, there are a series of deadlines to follow.

- 8 Weeks before Submitting Your Manuscript to the Library
Contact the Thesis and Dissertation Coordinator and arrange a Format Review
<http://thesis.gmu.edu/index.html>

- At Least 7 Weeks before Submitting Your Manuscript to the Library
Submit draft manuscript to your committee

- At Least 5 Weeks before Submitting Your Manuscript to the Library
Do a pre-defense with your committee—Mandatory for PhD students; recommended for MS thesis students.
Submit date and desired time of public defense to student services coordinator for room scheduling

- At Least 3 Weeks before Submitting Your Manuscript to the Library
Submit final manuscript to your committee
Student services coordinator announces your public defense

- At Least 1 Week before Submitting Your Manuscript to the Library
Public Defense
[The minimum “one week prior” to manuscript submission deadline is to allow time for the student to make revisions or corrections noted by the committee after the public defense.]

The **absolute** deadlines for the above processes are dependent on the “Thesis and Dissertation Submission Deadline”, which is different each semester. To find out what it is, go to the Registrar’s website. Click Students, then Graduation Services, then Timelines.

Guidelines for the content and general format of the doctoral dissertation may be found at <http://thesis.gmu.edu/index.html> . Contact the Thesis and Dissertation Coordinator at (703) 993-2222, Fenwick Library, for step-by-step instructions on preparing the dissertation.

XI. Graduation Procedures

1. Students can access graduation information on the Web at <http://registrar.gmu.edu/gif/index.html> . They must complete a Graduation Intent Form online.
2. The *Application for Graduation* must be completed by the student and submitted to the BCB program office. It is reviewed and signed by the Program Director and the Dean's office. A copy is made for the student's file and for verification of the program requirements. It is forwarded to the graduation section of the Registrar's office. This form is also available on the web at the same URL as above.

The deadlines to apply to graduate and to submit your dissertation manuscript vary each semester. Check the Registrar's website for a semester in advance.

