Institute of Bioinformatics
UNIVERSITY OF GEORGIA

Graduate Student Handbook

Reviewed Summer 2017

Really Useful Information

Contact Information:

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Athens, GA 30602-7229

Listserv Addresses

iobgrads@listserv.uga.edu   (all graduate students receive and can post to this list including administrators of the graduate program and IOB director)

binfgrads@listserv.uga.edu   (all graduate students only – this list is administered by the Bioinformatics Graduate Student Organization, BIGSA)

ioball@listserv.uga.edu   (all IOB members including graduate students, postdocs, and faculty)

IOB Website:
http://iob.uga.edu

IOB Events/Seminar Schedule:
https://iob.uga.edu/events/upcoming-seminars/

UGA Graduate School:
http://grad.uga.edu/

Doctor of Philosophy (Ph.D.) in Bioinformatics

Curriculum Requirements:

All students who enter the Ph.D. program in the Spring 2017 semester or later will follow the curriculum described below. Students who entered the IOB program prior to the Spring 2017 semester will have the option to graduate under the curriculum in place when they entered the program (see Appendix E) or transfer to the new curriculum requirements. However, students must satisfy all requirements of one curriculum or the other. No transferring from new to old curriculum or mixing and matching of requirements from the old and new curricula is allowed.

Students who enter the Ph.D. program through the Integrated Life Sciences (ILS) program will take the ILS Core Curriculum for the first semester. Currently, this one semester curriculum consists of lab rotations, a professional development class, a responsible conduct of research class, a scientific literature reading class and a data management class (http://ils.uga.edu/admissions/curriculum/). Upon selection of Bioinformatics as a major and entering the IOB Ph.D. program, the student is required to follow the curriculum described below. For a suggested course schedule, see Appendix A.

IOB Ph.D. curriculum overview:

Prerequisites-satisfied in Undergraduate courses	Core (All Required)	Electives
Intro Molecular Genetics Intro Biochemistry Intro to Statistics and Probability Proficiency in a programming language Intro Calculus	BINF 8441 (3.0) Statistical Inference for Life Sci BINF 8500 (3.0)** Bioinformatics Algorithms BINF 8600 (1.0) Intro to Grant Writing	One elective from IOB approved list One elective chosen by advisory committee
Routine Courses		
BINF 8060^ (1.0) – IOB Seminar BINF 8061^ (1.0) – IOB Student Seminar BINF 8970^ (1.0-2.0) – Lab Meeting BINF 8900L*(3.0) – Rotations BINF 9000 (1.0-18.0) – Dissertation research BINF 9300 (1.0-12.0) – Dissertation writing GRSC 7770 (1.0-3.0) – required for Teaching Assistants only		

*Satisfied by GRSC 8000 in ILS Program; ^Required every semester; ** Prerequisite course is BINF 6006 (if needed)

Requirements for 8000 Level Courses

Graduate School rules require that Ph.D. students with a Master's degree take at least 16.0 credit hours of 8000 level courses, while students without a Master's degree must take 20.0 credit hours of 8000 level courses. Doctoral research (9000), independent study courses, directed study, and dissertation writing (9300) may not be counted in the 8000 level requirements.

Program Prerequisites

It is assumed that students entering the program have taken introductory courses in molecular genetics, biochemistry, calculus, and statistics & probability. It is also assumed that the students are able to program in some programming language. Students who lack in any of these areas must take appropriate courses in their first year in the program. These courses may not be counted towards degree requirements.

Registration Requirements

Students will register for 18.0 credits in all semesters they are enrolled, including Summer semesters. This is to accurately reflect the time and effort BINF students put in to their research. Exceptions to this requirement are made on a case by case basis, and only in anticipation of the semester in which the requirement will not be met. Requests to enroll for less than the required amount should be submitted to the Graduate Program Administrator prior to registration for the effected semester. For specific questions, please contact the Graduate Program Administrator.

Core Courses

All students are required to take a core of three bioinformatics courses:

BINF 8441 (3.0): Statistical Inference for the Life Sciences. Introductory statistics for students in the life sciences, including probability, discrete and continuous random variables, distributions, expectations, maximum likelihood, Bayesian inference, hypothesis testing, and linear regression. These topics will be mixed with applications of the statistical concepts to biological data. Statistical inference and real data analysis are implemented in R.

BINF 8500 (3.0): Bioinformatics Algorithms. A hands-on course in which students will design and implement selected bioinformatics algorithms.

BINF 8600 (1.0): Grant Writing. The course introduces the principles of successful grant writing and manuscript preparation. Students are expected to develop and produce a grant proposal in the NIH or NSF format.

IOB Approved Electives

Students are required to take one elective course that focuses on applying bioinformatics analyses to real data. Examples include GENE (BINF) 8940, FANR (BINF) 8140, BINF 8980, PBIO (BINF) 8350, EHSC 8460(L), and MIBO (BINF) 8270L. Requests to add other courses to this list may be made in writing to the Graduate Affairs Committee. Any such course must have a strong emphasis on applications to the analysis of experimental data.

FANR (BINF) 8140 (3.0): Functional Genomics. Fundamentals and practical applications of functional genomics in biological research. Lecture- and paper-based discussion on topics including gene discovery, genome sequencing, transcript profiling by microarray, and next-generation sequencing

(RNA- Seq), regulation of gene expression, forward and reverse genetics, proteomics, metabolomics, correlation network analysis, and ecological genomics. Offered Spring semester every year.

GENE (BINF) 8940 (3.0): Applied Genome Analysis. Hands-on application of bioinformatics approaches used in whole genome analyses. Topics will include aspects of genome assembly, annotation, expression studies, ChIP-sequence, and comparative genomics. Emphasis is placed on mastery and critical evaluation of the approaches used for whole genome analyses rather than any particular software program or approach. Offered Fall semester each year.

MIBO (BINF) 8270L (3.0): Composition, Organization, and Evolution of Genomes. Computational approaches to the study of properties of eukaryotic and prokaryotic genomes, genome evolution, and statistical and computational methods for genome analyses and comparisons. Topics include composition of prokaryotic genomes, eukaryotic chromosome structure, lateral gene transfer, genome rearrangements. Emphasis will be placed on biological interpretations of sequence data. Offered Spring semester every year.

BINF 8980, 8980D (4.0): Case studies in Systems Biology. Shared research experience in systems biology. Each semester the research case study will be either on the biological clock, hot-pathogen interactions, or marine metagenomics. Project will include genomics experiments involving microfluidics, network identification, and genomic analysis. Emphasis will be placed on transformative research accomplished on the clock, host-pathogen system, or marine ecosystem. Offered Fall and Spring semester every year, as needed.

PBIO (BINF) 8350 (3.0), Molecular Phylogenetics and Evolution. The course includes hands-on training of phylogenetic methods, discussions of the underlying assumptions of these methods, and an opportunity to frame and execute a term project relevant to each student's research interests ranging from the evolutionary ecology of trait evolution and diversification to the molecular evolution of gene families. With just 12-16 students in the course, lecture topics will be tailored to student interests. Offered Spring semester every year.

EHSC 8460 (L) (1.0-3.0): Environmental Genomics. Covers the background and use of new high throughput genomic tools for environmental studies. Content and credits will vary depending on subjects covered, which are modified to meet the needs of enrolled students.

General Electives
Students are required to take one elective, as directed by their advisory committee. Any selection of elective that is approved by the Graduate Coordinator and the student's committee are acceptable. However, students will not be allowed to count program prerequisites as elective courses.

Additional Electives
Student advisory committees may specify additional requirements designed to extend the breadth or depth of the student's knowledge in the area of his/her specialization. These additional requirements may include both graduate and specialized undergraduate courses deemed appropriate by the student's advisory committee. It is expected that such additional requirements will be instituted mainly for students whose focus is more computational because these programs traditionally require more courses than biological disciplines.

Courses required for Teaching Positions

For those students who have a teaching assistantship at any point in their program, it is required they take GRSC 7770. If the student speaks English as a second language, they must pass a language proficiency exam. The exam will be coordinated through the Graduate School. If the student is unable to pass the proficiency exam, they must register for LLED 7768 or LLED 7769.

GRSC 7770 (1.0-3.0): Graduate Seminar. Provides graduate teaching assistants with knowledge of pedagogical approaches and available support systems. Special sections are reserved for international students, with focus on use of language, pedagogy, and cultural aspects of teaching in this country. Offered every year.

LLED 7768 (3.0): International Graduate Internship I. Provides international graduate teaching assistants with knowledge of pedagogical approaches and available support systems. The course focuses on cultural aspects of teaching and English language for the classroom with particular attention to pronunciation, stress, and intonation patterns. Offered Fall and Spring semester every year.

LLED 7769 (3.0): International Graduate Internship II. Provides international graduate teaching assistants with knowledge of pedagogical approaches and available support systems. The course focuses on English language for the classroom and cultural aspects of teaching with emphasis on presentation skills and audience awareness. Offered Fall and Spring semester every year.

Other Required Courses

In addition to the above courses, all students are required to take the following courses:

- BINF 8060 (1.0): IOB Seminar. Taken every Fall and Spring semester
- BINF 8061 (1.0): IOB Student Seminar. Taken every Fall and Spring semester
- BINF 8900L (3.0): Lab rotation*
- BINF 8970 (1.0-2.0): Current Topics in Research. Lab meetings, **taken every semester**
- BINF 9000 (1.0-18.0) : Doctoral research. Taken to fulfill credit load requirements after the completion of courses
- BINF 9300 (3.0-12.0) : Doctoral dissertation. Minimum of 3.0 credits total

*Satisfied by GRSC 8000 in ILS Program

BINF 8060 (1.0): Bioinformatics Seminar. Seminar dealing with various topics in current Bioinformatics. Offered Fall and Spring semester every year.

BINF 8061 (1.0): Institute of Bioinformatics Student Seminar. A special seminar classed focused on student research presentations with an emphasis on presentation skills. While all students are required to attend, only students in their second year and beyond are required to present. Offered Fall and Spring semester every year.

BINF 8900L (3.0): Bioinformatics Lab Rotation. Students will be exposed to research topics and techniques by participating in the research projects of Bioinformatics faculty members. Offered Fall and Spring semester every year, as needed. Satisfied by GRSC 8000 in ILS Program.

BINF 8970 (1.0-2.0): Current Topics in Research. Subjects of current interest in Bioinformatics research. Current literature and modern analysis of research results. Course is designed to meet the specific research needs of the student. Offered at the request of faculty. This course is also used to cover student time and effort spent in research lab meetings within their chosen research laboratory.

Students register for sections offered by their thesis advisor. Offered Fall, Spring, and Summer semester every year.

BINF 9000 (1.0-18.0): Doctoral Research. Research while enrolled for a doctoral degree under the direction of faculty members. Offered Fall, Spring and Summer semester every year.

BINF 9300 (1.0-12.0): Doctoral Dissertation. Dissertation writing under the direction of the major professor. Offered Fall, Spring and Summer semester every year.

NOTE: Bioinformatics students are to take 9000 and 9300 hours in BINF only. No other department courses in 9000 and 9300 will be allowed.

Lab Rotations

Students who are not committed to a major professor upon entering the program will rotate through labs in order to find a major professor. Students will spend one third of a semester in each of up to three different labs, participating in research work in that lab (BINF 8900L). Rotations will occur on a regular schedule. See the IOB faculty Webpage for a list of approved faculty and links to their sites (http://iob.uga.edu/faculty/).

Students who enter through the ILS program will complete rotations in their first semester at UGA. ILS students register for GRSC 8000 (Lab Rotations) and will complete three 6-week rotations during the semester. By the end of the first semester, ILS students will join a lab. ILS students will begin taking the IOB Core curriculum upon joining the Bioinformatics program. Please be pro-active in contacting faculty about arranging rotations.

Advisory Committee

Upon arrival at the University, students will meet with the Graduate Coordinator and/or the Graduate Program Administrator for guidance and mentoring.

Because this program is interdisciplinary, students will be advised to take prerequisite courses in areas where the student does not have the necessary background.

Students will select their major professor by the end Fall semester of their first year. The major professor must be a Full or Adjunct Faculty member of the Institute of Bioinformatics, and a member of the Graduate Faculty. *By the end of Spring semester of the first year, students must establish an advisory committee.* The advisory committee must consist of the major professor and at least three other UGA Graduate Faculty members. At least two members of the advisory committee must be Full or Adjunct Faculty of the IOB. The advisory committee should be composed of representatives of both the biological and the quantitative sciences. At least one member of the advisory committee will represent the student's focused area of study e.g. computer science, plant biology, microbiology, etc., from outside the institute. This member of the committee will provide input from outside bioinformatics and ensure that the program of study is consistent with the practices of the most related outside discipline.

The advisory committee will meet with the students no less than once a year. The advisory committee will be responsible for mentoring the student's research and training, approving the student's program of study, administering the written and oral comprehensive examination, approving the subject for the dissertation, approving the completed dissertation, and approving the student's defense of his or her

research. Students will take their comprehensive examination during their second year, supervised by the major professor, under the Graduate School guidelines. For more information, see Appendix B.

Advisory Committee form is required, see:

http://grad.uga.edu/index.php/current-students/forms/

IOB Comprehensive Examination

The comprehensive exam will be comprised of a written portion and an oral portion. The written portion will take place before the oral portion. The student should contact the Graduate Program Administrator when they have scheduled the written portion of the exam, which will consist of a written proposal of their dissertation research, based on NIH guidelines. It is expected that students are able to articulate the rationale for their proposed research and be able to explain their research strategy. UGA Graduate School requirements indicate that there may be only one failing grade from the committee for the exam to be considered passing. The student's advisor may issue a failing grade and the student may still pass. Upon receiving a passing grade on the written portion, the proposal should be forwarded to the Graduate Program Administrator to be added to the student's academic file. Additionally, the student's advisor should email the Graduate Program Administrator and Graduate Coordinator, reporting the student's passing grade. If the student fails the written portion of the exam, the advisor should email the Graduate Coordinator and Graduate Program Administrator as soon as possible, detailing the outcome of the exam.

After passing the written exam, the student should contact the Graduate Program Administrator to begin scheduling the oral portion of the exam. The Graduate School requires at least two weeks' notice of the oral exam. The Graduate Program Administrator will work with the student to prepare the required paperwork for submission to the Graduate School.

The oral exam will last at least two hours, but not longer than three hours. The student will prepare a presentation of no more than 20 slides that are intended to serve as a framework of the discussion of the proposed research. The student's presentation should last for approximately 20-25 minutes. Questions during the exam will consist of both general and specific knowledge related to the student's proposed research as described in their presentation and written proposal. A member of the student's committee, other than the advisor, will serve as chair of the exam. The advisor is not allowed to answer questions for the student, and will not participate in the discussion unless granted permission by the exam chair. UGA Graduate School requirements indicate that there may be only one failing grade from the committee for the exam to be considered passing. The student's advisor may issue a failing grade and the student may still pass.

Students who fail their comprehensive exam, either written or oral portion, may make a second attempt at the exam. If the student fails on the second attempt, the matter will be forwarded to the Graduate Affairs Committee for review and recommendations. Possible outcomes include, but are not limited to, change of degree objective from PhD to masters level, or student exiting the program without degree. Recommendations from the Graduate Affairs Committee may be considered after reviewing the situation with the student, the student's advisor, and getting feedback from the student's advisory committee.

Students are expected to complete their comprehensive exams during the spring semester of their second year. The timing between submission and grading of the written portion of the exam and the oral exam should be no more than 4 weeks.

For detailed instructions on the comprehensive exams, please refer to Appendix B.

Final Program of Study Form is required PRIOR to Notice of Exam, see:

http://grad.uga.edu/index.php/current-students/forms/

Dissertation Planning

A written proposal, or prospectus, is prepared as part of the comprehensive exam. This proposal will detail the breadth and scope of research the student plans to undertake during their dissertation research. It is expected that the committee will provide input on this proposal so the student can focus on a viable dissertation project. However, it is expected that the proposal will be entirely the student's own work. It is important to note that the student is not required to have data prior to taking their comprehensive exams.

Admission to Candidacy

The student will submit an Application for Admission to Candidacy form along with the Report of the Written and Oral Comprehensive Examination form, indicating they have passed the comprehensive exam. The Graduate Program Administrator will assist the student in the preparation of the required forms. The Application for Admission to Candidacy for Doctoral Degrees form must be filed with the Graduate School at least one semester before graduation. Once the student has been admitted to candidacy, they may register for Doctoral Dissertation (BINF 9300) credit hours.

The Graduate School prepares the Report of Written and Oral Comprehensive Examination form and sends it to the Graduate Program Administrator.

Application for Admission to Candidacy is required, see:

http://grad.uga.edu/index.php/current-students/forms/

Dissertation Approval and Defense

The student's dissertation must represent originality in research, independent thinking, scholarly ability, and technical mastery of a field of study in bioinformatics. The dissertation must also demonstrate competent style and organization (see Graduate School for guidelines for theses and dissertations). While working on his/her dissertation, the student must enroll for a minimum of 3.0 credit hours of BINF 9300 (Doctoral Dissertation). Students may not register for this course until they have been admitted to candidacy. Once the student's major professor approves the final version of the dissertation, it will be distributed to the other members of the advisory committee, and a dissertation defense scheduled no sooner than three weeks after the distribution. This exam requires that all members of the advisory committee be present and is open to faculty members, graduate students, and the public (per Graduate School policy). The Graduate School requires two weeks' notice of the defense exam; therefore the student will contact the Graduate Program Administrator prior to scheduling the defense and provide the Notice of Exam form at least three weeks prior to the defense date. All but one of the members of the advisory committee must approve the student's dissertation and defense. These results are recorded and submitted to the Graduate School on the Approval Form, provided by the Graduate Program Administrator prior to the scheduled defense.

Dissertation and Final Examination Approval form is required, see:

http://grad.uga.edu/index.php/current-students/forms/

Electronic Thesis and Dissertation (ETD) Submission Approval form is required, see:

http://grad.uga.edu/index.php/current-students/forms/

Master of Science (M.S.) in Bioinformatics

Curriculum Requirements

Because of its interdisciplinary nature, the bioinformatics M.S. degree program admits students from diverse backgrounds and leads to multiple career paths, depending upon the background and interests of the students. Thus, the curriculum is designed to provide flexible training of a diverse student body while maintaining the rigor of the program.

All students are required to take BINF 8900L (Lab rotation) in their first semester in the program. Students who enter the program committed to a lab should take this course in place of research credits, but are not required to rotate. Master students are required to take BINF 8990 (Colloquium) once.

In addition, 6.0 credit hours of BINF 7000 (Master's research) and 3.0 credit hours of BINF 7300 (Master's thesis) are required for students with the thesis option. In the absence of a thesis, students will take 9.0 credit hours of 8000 level courses in an area of specialization to be approved by their committee as well as prepare a final technical report on a topic assigned by the student's advisor.

Registration Requirements

Students will register for 18.0 credits in all semesters they are enrolled, including Summer semesters. This is to accurately reflect the time and effort BINF students put in to their research. Exceptions to this requirement are made on a case by case basis, and only in anticipation of the semester in which the requirement will not be met. Requests to enroll for less than the required amount should be submitted to the Graduate Program Administrator prior to registration for the effected semester. For specific questions, please contact the Graduate Program Administrator.

Core courses for M.S. Program

Every M.S. student needs to take the following four core courses and complete any prerequisites for these courses.

Course	Title	Credits
BINF 8211*	Advanced Methods for Biological Data Analysis II	3.0
BINF 8940	Applied Genome Analysis	3.0
STAT 8440	Statistical Inference for Bioinformatics	3.0
BINF 8500	Bioinformatics Algorithms	3.0

*Course not offered of a regular basis, substitutions may be requested through IOB Graduate Coordinator.

M.S. Lab Rotations

Students who are not committed to a major professor upon entering the program will rotate through three labs in order to find a major professor. Students will complete three 6-week rotations in three different labs, participating in research work in that lab. Rotations will happen in the first semester of the first year. See the IOB webpage for a list of IOB faculty and links to their Web pages (http://iob.uga.edu/faculty/). All students should register for BINF 8900L in their first semester in the program. If a student is already committed to a lab, then this course will be taken in place of research credit (these students are not required to rotate). Students will choose a major professor and join a lab by the end of the first semester in the program.

M.S. Advisory Committee

Upon arrival at the University, students will meet with the Graduate Coordinator and/or the Graduate Program Administrator for guidance and mentoring.

Because this program is interdisciplinary, students will be advised to take prerequisite courses in areas where the student does not have the necessary background.

By the end of their first year in the program, students will establish an advisory committee. The major professor must be a core IOB faculty member or an adjunct faculty member of the Institute of Bioinformatics, as well as a member of the Graduate Faculty. The advisory committee must consist of the major professor and at least two other Graduate Faculty members. At least two members of the advisory committee must be full or adjunct faculty of the IOB. The advisory committee will also be composed of representatives of both the biological and the quantitative sciences.

Advisory Committee form is required, see:

http://grad.uga.edu/index.php/current-students/forms/

Final Program of Study form must be submitted by the second semester of residence. The Program of Study Form indicates how and when degree requirements will be met and must be formulated in consultation with the student's major professor.

Final Program of Study for MS Degree, see:

http://grad.uga.edu/index.php/current-students/forms/form-instruction/#ms

http://grad.uga.edu/index.php/current-students/forms/

Master's Thesis

The thesis is a report of the student's investigations under the supervision of his/her major professor and requires the approval of the major professor and the advisory committee. The thesis must demonstrate competent style and organization, and communicate technical knowledge. The thesis often includes original research in bioinformatics. It must demonstrate mastery of a particular area of bioinformatics. The student's advisory committee assures that the quality of the thesis meets the standards of the IOB and the Graduate School. The candidate must register for BINF 7300 (Master's Thesis) for at least 3.0 credit hours while working on the thesis.

M.S. Thesis Defense

After all course work has been completed and the thesis has been approved by the student's major professor, the thesis is submitted to the other members of the advisory committee at least two weeks before the thesis defense date. The thesis defense is an oral examination conducted by the student's advisory committee. The Graduate School requires two weeks' notice of the defense exam; therefore the student will contact the Graduate Program Administrator prior to scheduling the defense. All members of the advisory committee must be present at the defense. The advisory committee members, including the major professor, must vote on whether the student passed the defense and record their votes. These results are recorded and submitted to the Graduate School on the Approval Form, provided by the Graduate Program Administrator prior to the scheduled defense. To pass the exam, at least two of the three votes must be passing.

Thesis Defense and Final Examination Approval form required, see:

http://grad.uga.edu/index.php/current-students/forms/

Electronic Thesis and Dissertation (ETD) Submission Approval form required, see:

http://grad.uga.edu/index.php/current-students/forms/

M.S. Graduation Requirements

Before the end of the second semester in residence, a student must submit to the Graduate School, through the Graduate Program Administrator, the Masters **Program of Study form**. The Program of Study Form indicates how and when degree requirements will be met and must be formulated in consultation with the student's major professor. An **Application for Graduation form** must also be submitted directly to the Graduate School.

For forms, please see: http://grad.uga.edu/index.php/current-students/forms/

Graduate Certificate in Bioinformatics

Curriculum Requirements

Graduate students in any department at UGA can receive the Graduate Certificate in Bioinformatics by taking bioinformatics coursework. Students seeking a Certificate must be currently enrolled and in good standing in a graduate program at the University of Georgia, Athens.

The requirements for the certificate in Bioinformatics are:

1. BINF 8210: Computational Methods in Bioinformatics
2. BINF 8211: Computational Applications in Bioinformatics*
   *Course not offered of a regular basis, substitutions may be requested through IOB Graduate Coordinator.
3. STAT 8440: Statistical Inference for Bioinformatics
4. A single graduate level course in Biology
5. A single computer sciences course from the list below:

   CSCI 6490: Algorithms for Computational Biology
   CSCI 7010: Computer Programming
   CSCI 6140: Numerical Methods and Computing
   CSCI 6150: Numerical Simulations in Science and Engineering
   CSCI 6370: Database Management
   CSCI 6470: Algorithms
   CSCI 6490: Algorithms for Computational Biology
   CSCI 6500: Programming Languages
   CSCI 6560: Evolutionary Computation and its Applications
   CSCI 6850: Biomedical Image Analysis
   CSCI 8140: Parallel Processing and Computational Science
   CSCI 8150: Advanced Numerical Methods and Scientific Computing
   CSCI 8370: Advanced Database Systems
   CSCI 8470: Advanced Algorithms
   CSCI 8850: Advanced Biomedical Image Analysis

How to Apply for a Certificate

If you are applying prior to completing the certificate coursework, contact the Graduate Program Administrator with your interest in the Certificate Program. Include your name, student identification (810 or 811), your department, and degree program. Upon receipt of this information, the certificate program will be added to your registration profile in Athena. If you need assistance with course scheduling to complete the certificate requirements, please contact the Graduate Program Administrator.

If you have completed coursework toward the certificate program and wish to apply for the certificate, send a letter to the Graduate Program Administrator of the Institute of Bioinformatics that includes the following: your name, your student identification (810 or 811), and the courses completed to fulfill the Certificate requirements. This request must be received one semester prior to the semester you plan to graduate.

In addition, please include information on the courses you have taken for credit toward the certificate. For each course, include only the course prefix and number (e.g. BINF 8210) and the semester in which the course was completed. Include a copy of your transcript that shows the grades for the course used for completion of the Certificate. For courses recently completed whose grades are not included on your transcript, include a brief letter from the instructor stating that you have received a grade B or higher.

Please note: the Certificate is not a document that is mailed to you, but a notation added to your transcript, which would say "COMPLETION OF A CERTIFICATE IN BIOINFORMATICS".

Graduate School Requirements

The Graduate School sets forth additional requirements concerning residence, time limits, programs of study, acceptance of transfer credits, admission to candidacy, minimum GPAs, dissertation, and examinations, etc. The students should refer to the Graduate School Bulletin for details.

Probation and Dismissal Policy

The Institute of Bioinformatics reserves the right to place students on probation or dismiss them if they have not made sufficient academic progress or if they have willfully gone against IOB policy. The IOB Graduate Affairs Committee will review the student's situation and will meet with the student and advisor as needed. If it is found that the student has failed to meet expectations, the student may be dismissed from the Institute of Bioinformatics.

For details on the Graduate School's Probation and Dismissal Policies, please visit their website.

Course Waiver Policy

A faculty advisor may request a student waiver for a course by making a request to the Graduate Affairs Committee. The request must come from the student's advisor and not from the student directly. The request and materials should be send to the Graduate Coordinator, with the Graduate Program Administrator copied in the email. For the exception to be considered, the advisor must supply supporting evidence, such as: (1) syllabi of related courses prior to the one required; (2) relevant work experience; or (3) transcripts indicating satisfactory grades.

Once all materials are received, GAC will review and vote on whether the student has sufficient knowledge to waive the course requested.

Expectation of Graduate Students

The institute of Bioinformatics expect their graduate student to actively contribute to and participate in all aspects of the graduate program. This includes attending IOB seminars, IOB social events, retreats, graduate student and faculty recruitment events, and engaging in the intellectual life of the institute.

Graduate research is a full-time job. This work is the start of your career, so the more effort you put in to it, the better start you will have. More important than the hours you spend working is your ability to

communicate with your advisor and committee. It is expected that you will communicate your regular course schedule with your advisor so they know when to expect to see you in the lab. In addition, any changes to your schedule, be it vacation, holidays, life events, etc., should be communicated to your advisor. We know that you have personal lives outside of graduate school, but you are expected to report to your advisor as you would an employer.

Should you be in a situation where you are considering additional employment outside of your graduate assistantship, please discuss the details with your advisor and the Graduate Coordinator, so they are aware of the details an can work with you so you do not get behind in your research. Communication is key!

Multiple Program Enrollment

Bioinformatics student who are interested in pursuing an additional degree while enrolled at UGA must speak with the Graduate Program Administrator, and Graduate Coordinator. Before applying to or enrolling in an additional program, students will receive written approval from their faculty advisor to enroll in courses toward a degree other than their Bioinformatics program. This allows for the paperwork to be processed correctly for both degrees. Such approval may be contingent upon progress toward their primary degree, grant funding sources, project compatibility, and lab work requirements.

APPENDIX A:

Sample Curriculum:

First Year:

> *Fall:* ILS students will complete the core course requirements set by the ILS program. For the most up-to-date listing of the ILS curriculum, please visit their website: http://ils.uga.edu/admissions/curriculum/

> Students admitted directly to the IOB Ph.D. program will consult the IOB Graduate Coordinator to plan their course schedule for their first fall semester in the program. If admitted during the spring semester, BINF 8900L will replace BINF 9000.

Spring:	*Summer:*
• BINF 6006 (prereq for algorithms) • BINF 8001- Intro to Bioinformatics • BINF 8441 • BINF 8060 - IOB seminar • BINF 8061 - Student seminar • BINF 8070 - Lab Meeting • BINF 9000 - Research	• BINF 8970 • BINF 9000

Second Year:

Fall:	*Spring:*	*Summer:*
• BINF 8500 • BINF 8600 • Elective • BINF 8060 • BINF 8061 • BINF 8970 • BINF 9000	• Elective • BINF 8060 • BINF 8061 • BINF 8970 • BINF 9000 ***Complete Comprehensive Exam***	• BINF 8970 • BINF 9000

Third and Fourth Year:

Fall:	*Spring:*	*Summer:*
• BINF 8060 • BINF 8061 • BINF 8970 • BINF 9000 Any electives as recommended by advisory committee	• BINF 8060 • BINF 8061 • BINF 8970 • BINF 9000 Any electives as recommended by advisory committee	• BINF 8970 • BINF 9000 and/or • BINF 9300

Fifth Year (if applicable):

Fall:	_Spring:_
• BINF 8060	• BINF 8060
• BINF 8061	• BINF 8061
• BINF 8970	• BINF 8970
• BINF 9000 and/or	• BINF 9000 and/or
• BINF 9300	• BINF 9300

APPENDIX B:

Comprehensive Exams

The comprehensive exam will be comprised of a written portion and an oral portion. The written portion will take place before the oral portion. The student should contact the Graduate Program Administrator when they have scheduled the written portion of the exam, which will consist of a written proposal of their dissertation research, based on NIH guidelines. It is expected that students are able to articulate the rationale for their proposed research and be able to explain their research strategy. UGA Graduate School requirements indicate that there may be only one failing grade from the committee for the exam to be considered passing. The student's advisor may issue a failing grade and the student may still pass. Upon receiving a passing grade on the written portion, the proposal should be forwarded to the Graduate Program Administrator to be added to the student's academic file. Additionally, the student's advisor should email the Graduate Program Administrator and Graduate Coordinator, reporting the student's passing grade. If the student fails the written portion of the exam, the advisor should email the Graduate Coordinator and Graduate Program Administrator as soon as possible, detailing the outcome of the exam, and indicate the timeline for the student to resubmit their proposal for grading.

After passing the written exam, the student should contact the Graduate Program Administrator to begin scheduling the oral portion of the exam. The Graduate School requires at least two weeks' notice of the oral exam. The Graduate Program Administrator will work with the student to prepare the required paperwork for submission to the Graduate School. According to UGA Graduate School rules, the oral exam is a public exam. The Graduate School must be notified at least two weeks before the examination so that the Graduate School can publish notice of the exam, and send the required paperwork to the Graduate Program Administrator. The students should send the necessary information to the Graduate Program Administrator using the Notice of Examination form, at least three weeks prior to the oral exam date.

The oral exam will last at least two hours, but not longer than three hours. The student will prepare a presentation of no more than 20 slides that are intended to serve as a framework of the discussion of the proposed research. The student's presentation should last for approximately 20-25 minutes. Questions during the exam will consist of both general and specific knowledge related to the student's proposed research as described in their presentation and written proposal. A member of the student's committee, other than the advisor, will serve as chair of the exam. The advisor is not allowed to answer questions for the student, and will not participate in the discussion unless granted permission by the exam chair. UGA Graduate School requirements indicate that there may be only one failing grade from the committee for the exam to be considered passing. The student's advisor may issue a failing grade and the student may still pass. Scores for both the written and oral portions of the exam should be noted on the Oral Exam Approval form, which should also be signed by all committee members and returned to the Graduate Program Administrator for further processing.

Students who fail their comprehensive exam, either written or oral portion, may make a second attempt at the exam. If the student fails on the second attempt, the matter will be forwarded to the Graduate Affairs Committee for review and recommendations. Possible outcomes include, but are not limited to, change of degree objective from PhD to masters level, or student exiting the program without degree. Recommendations from the Graduate Affairs Committee may be considered after

reviewing the situation with the student, the student's advisor, and getting feedback from the student's advisory committee.

Students are expected to complete their comprehensive exams during the spring semester of their second year. The timing between submission and grading of the written portion of the exam and the oral exam should be no more than 4 weeks. Should a delay in examination be approved, students should note that registration will be withheld until a date is set to retake the exam. Absolute deadline to complete the exam in its entirety is the end of fall semester in their third year. Failure to do so will result in registration holds.

Research Proposal Guidelines

The written research proposal will take the form of an NIH grant proposal (but without the budget and human subject/animal use approvals), which is prepared by the student as a possible dissertation research prospectus. The student should consult with their major professor regarding the exact format of the proposal but should follow NIH grant preparation instructions (e.g. the font size should be at least 11 pt, and the document should be single-spaced, with numbered pages, and one inch margins). In general, the proposal should include an introduction or background section reviewing the relevant literature, major hypotheses, specific aims for the project, preliminary results (optional), and the proposed methods for achieving the specific aims. This should outline specific procedures to be performed for each aim, and include potential outcomes, potential problems, and alternative approaches. The proposal should be concisely written, and should be no longer than 12 pages (excluding references). Numbered tables and figures with legends should be embedded into the appropriate sections of the text, with full-page copies of each figure included as appendices (not included in the page limit). The proposal must be presented in writing to the Advisory Committee at least two weeks before the oral preliminary exam.

The proposal does not have to be based on preliminary results already obtained by the student. The purpose of this proposal is to evaluate the student's ability to develop and present a coherent, logical, and well-thought-out research project in the area of their thesis research. As such, while the student may consult with their major professor regarding the written proposal prior to distributing it to their committee, the proposal should represent the student's independent work.

The research plan in the dissertation proposal is not meant to be a blueprint for completion of the degree – it is expected that changes in the actual progress of the project may occur over time, in consultation with the student's Advisory Committee and advisor.

Oral exam guidelines

The oral exam will begin with the student delivering a 20-25 minute oral presentation based on the written research proposal. At any time during the presentation, the committee may question the student on any subject relevant to the proposal. In order for the oral exam to assess the student's capacity for independent thinking, the major professor is not allowed to answer questions on the student's behalf. To ensure this, another member of the student's committee will be designated by the major professor to be in charge of the exam. If deemed necessary by the presiding committee member, the major professor may clarify some questions or may question the student in limited areas. In general, the oral exam should last about 2 hours, but not longer than 3 hours.

Oral exam grading

As with the written exam, a student may pass, pass with conditions, or fail the oral exam. No more than one dissenting vote is permitted for the student to pass the oral examination. The major professor's/co-major professors' vote of approval is required for the student to pass the examination. If the Advisory Committee feels that the student has a particular area of weakness, he or she may be required to do additional coursework or directed reading in that area. In addition, the committee members may require that the student rewrite the dissertation proposal. For additional questions, please contact the Graduate Program Administrator.

Admission to Candidacy

The student must petition for admission to candidacy following successful completion of both parts of the examination. To do so requires submittal of the appropriate form, which will be provided to the student prior to the oral examination. Prior to applying for candidacy, students must provide the Graduate School with a final Doctoral Program of Study form. There is a two-semester residence requirement following admission to candidacy before the student can graduate. For additional questions, please contact the Graduate Program Administrator.

APPENDIX C:

Suitable Electives

*6000-level courses do not count toward Graduate School residency requirements.

        In an effort to maintain an accurate listing of UGA courses related to bioinformatics, a course listing is available on the IOB website. Please refer to that listing for the most up-to-date courses available. Here is the link:

https://iob.uga.edu/graduate-courses/

APPENDIX D:

Ph.D. Student Checklist

Coursework:

Core, all required:

☐ BINF 8441   ☐ BINF 8500   ☐ BINF 8600

IOB Approved Elective: Pick one

☐ _____ Course

Committee Approved Elective: Pick one

☐ _____ Course

Other Required Courses

☐ BINF 8060, each semester   ☐ BINF 8061, each semester   ☐ BINF 8900L or GRSC 8000

☐ BINF 8970, lab meeting   ☐ BINF 9000   ☐ BINF 9300

☐ GRSC 7770 (teaching assistants only)

Dates:

Begin at UGA:

Enter IOB Program:

Date of Written Exams:

Date of Oral Exam:

Admission to Candidacy:

Date of Notice to Graduate:

Date of Defense:

Required Forms – Ph.D.:

First Year:

☐ Advisory Committee form, end of second semester (May)

☐ Program of Study, preliminary (May)

Second Year:

☐ Annual Student Evaluation

☐ Program of Study, final (at least two weeks' prior to written exam)

☐ Notice of Exam-Written exam, to Graduate Program Administrator

☐ Notice of Exam-Oral exam, to Graduate Program Administrator (three weeks' prior to oral exam)

☐ Report of the Written and Oral Comprehensive Examination form (upon completion of oral exam)

☐ Application for Admission to Candidacy (upon completion of oral exam)

Third Year:

☐ Annual Student Evaluation

Fourth Year:

☐ Annual Student Evaluation

Final Semester:

☐ Application for Graduation-directly to Graduate School (check due date on Graduate School website)

☐ Format Check-directly to Graduate School, deadline applies

☐ Notice of Exam-Dissertation Defense (three weeks' prior to the oral defense)

☐ Dissertation and Final Examination Approval (upon passing of dissertation defense)

☐ Electronic Thesis and Dissertation (ETD) Submission Form (upon passing of dissertation defense)

☐ Graduation Ceremony Information-directly to Graduate School

To view forms: http://grad.uga.edu/index.php/current-students/forms/

Forms are prepared and submitted by the Graduate Program Administrator, unless otherwise stated.

M.S. Student Checklist

Coursework:

Core, all required:

☐ BINF 8211 (or substitution)   ☐ BINF 8940   ☐ STAT 8440   ☐ CSCI 6490

Other Required Courses

Thesis option:

☐ BINF 8060, each semester   ☐ BINF 8061 each semester   ☐ BINF 8900L

☐ BINF 8970, lab meeting (if applicable)   ☐ BINF 7000   ☐ BINF 7300

Non-Thesis option:

Pick Three 8000-level courses:

☐ _____ Course   ☐ _____ Course   ☐ _____ Course

☐ Preparation of final technical report on a topic assigned by advisor

☐ BINF 8060, each semester   ☐ BINF 8061 each semester

Dates:

Begin at UGA:

Enter IOB Program:

Date of Notice to Graduate:

Date of Defense:

Required Forms: M.S.:

First Year:

☐ Advisory Committee form, end of second semester (May)

☐ Final Program of Study, second semester of residence, but no later than the Friday of the second full week of classes of the semester in which the student intends to graduate.

Second Year:

☐ Annual Student Evaluation

Final Semester: (Thesis option)

☐ Application for Graduation-directly to Graduate School (check due date on Graduate School website)

☐ Format Check-directly to Graduate School, deadline applies

☐ Notice of Exam-Thesis Defense (three weeks' prior to the oral defense)

☐ Thesis Defense and Final Examination Approval (upon passing of thesis defense)

☐ Electronic Thesis and Dissertation (ETD) Submission Form (upon passing of thesis defense)

☐ Graduation Ceremony Information-directly to Graduate School

To view forms: http://grad.uga.edu/index.php/current-students/forms/

Forms are prepared and submitted by the Graduate Program Administrator, unless otherwise stated.

Final Semester: (Non- thesis option)

☐ Application for Graduation-directly to Graduate School (check due date on Graduate School website)

☐ Graduation Ceremony Information-directly to Graduate School

To view forms: http://grad.uga.edu/index.php/current-students/forms/

Forms are prepared and submitted by the Graduate Program Administrator, unless otherwise stated.

APPENDIX E:

IOB Ph.D. curriculum overview (Effective August 2015 through May 2017)

Prerequisites-satisfied in Undergraduate courses	Core (All Required)	Math/Stat/Comp Sci Elective (Pick One)
Intro Molecular Genetics Intro Biochemistry Intro to Statistics and Probability Knowledge of a programming language Intro Calculus	BINF 6006 (4.0) STAT 8440 (3.0)^^ BINF 8950 (3.0) (BINF 8980 as alternative to 8950)	STAT 6315 (4.0)** STAT 6220 (3.0)** MATH 6780 (3.0) CSCI 6490 (4.0) -Others, see below
Bioinformatics Elective (Pick One)	**Other Required Courses**	
BINF 8940 (3.0) BINF 8270L (3.0) BINF 8140 (3.0) BINF 8980 (4.0) BINF 8350 (3.0) BINF 8211 (3.0) -Others, see below	BINF 8060[^] (1.0) IOB Seminar BINF 8061[^] (1.0) IOB Student Seminar BINF 8970[^] (1.0-2.0) Lab Meeting BINF 8900L*(3.0) Rotations BINF 8990 (1.0) Colloquium (First year) BINF 9000 (1.0-18.0) Dissertation research BINF 9300 (1.0-12.0) – Dissertation writing GRSC 7770 (1.0-3.0) – required for Teaching Assistants only	

*Satisfied by GRSC 8000 in ILS Program; [^]Required every semester; ** Prerequisite options for STAT 8440; ^^Requires STAT prerequisite, 6315 or 6220