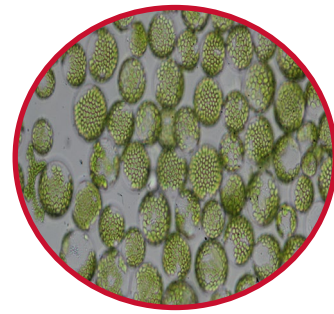


INTERDEPARTMENTAL BIOINFORMATICS AND COMPUTATIONAL BIOLOGY GRADUATE PROGRAM



Effective Fall 2023-Spring 2024

2014 Molecular Biology Building
Iowa State University
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THIS HANDBOOK . . .

This student handbook is provided to give general guidance about important issues and activities that you will encounter in your graduate career. Because the BCB interdepartmental graduate major continually seeks to improve, as does the entire graduate education program at Iowa State, some changes may occur between the times of the annual printing of this handbook. You are expected to stay in close communication with your major professor and BCB program staff regarding important issues. You are also encouraged to bring questions and comments to the Chair and members of the Supervisory Committee of BCB at any time.

THE BCB MAJOR

The Bioinformatics and Computational Biology (BCB) Program at Iowa State University is an interdepartmental graduate major offering outstanding opportunities for graduate study. It is one of the largest such Ph.D. programs in the nation both in terms of students and faculty strength and diversity of research. Currently, more than 75 nationally and internationally known faculty – biologists, computer scientists, engineers, mathematicians, physicists and statisticians – participate in a wide range of collaborative projects.

Our graduate students in the BCB Program have the opportunity to conduct research in all major research areas of computational molecular biology, including genomics, structural genomics, functional genomics, and computational systems biology, with access to some of the most modern experimental platforms.

BCB students are trained to develop an independent and creative approach to science through a highly interdisciplinary curriculum and thesis research projects that include both novel biological and computational/mathematical components. First-year students are appointed as research assistants and have the opportunity to do research exploration rotations in various laboratories to gain experience in both "wet" and "dry" lab environments before selecting the laboratory in which to do their graduate research. In the second year, students initiate a thesis research project under the guidance of two faculty mentors, one from the biological sciences and one from the quantitative/computational sciences. BCB students are encouraged to participate in internships with academic or industrial partners during their degree program. The M.S. and Ph.D. degrees are usually completed in two and five years, respectively.

This document is for graduate students enrolled in Bioinformatics and Computational Biology Interdepartmental Graduate Program and supplements the Iowa State University [Graduate College Handbook](#). It specifies the programs academic requirements. It also covers policies and procedures relevant to graduate student life, and provides other contact information. While this information may be of interest to students applying for admission, this document does not cover the admission process. See the [Bioinformatics and Computational Biology](#) web site for information about admissions.

Bioinformatics and Computational Biology offers PhD and Master of Science with Thesis. This program does NOT offer non-thesis Master of Science or online degrees.

ADMINISTRATION – PROGRAM CONTACTS

Bioinformatics and Computational Biology program activities are overseen by the Chair, Supervisory Committee, and Graduate Student Services Specialist. Please contact us if you have any questions about the program.

As you progress through the program, you will eventually have questions. Where most of the information is available on the ISU websites, feel free to contact the people below with any additional questions.

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BCB LEARNING GOALS

Learning Goals that students in this program are expected to meet include:

- Be able to formulate a research question, devise a plan to answer it, and independently implement it, as evidenced by passing their preliminary exam and the dissertation defense.
- Have a minimum of one paper submitted to a peer-reviewed journal. The manuscript should be directly related to their dissertation project, and they should have contributed a substantial part of the work and authorship. However, the expectation is that a typical dissertation consists of 2-4 independently publishable manuscripts.
- Be able to communicate science clearly as evidenced by oral presentations, poster presentations, and the writing of articles, grant proposals, or both.
- Be able to program: develop and encode methods for data discovery and/or analysis (as opposed to the exclusive deployment of existing software and tools for computational analyses).
- Be experts in both the biological and computational components of their fields of study.
- Meeting these expectations is built into BCB course requirements and POS committee expectations. The major professor, or the major professor and co-major professor jointly, must be competent to oversee the interdisciplinary research required of students. Care should be taken that each student supervised in the program shall be able to receive unhindered guidance in both fields, to best serve the program's requirements.

FIRST YEAR REQUIREMENTS

- Your Graduate Student Information can be obtained through [AccessPlus](#).
- During the first year, students take nine credits (three credits of rotation) for Fall and Spring semesters. You will complete no less than three rotations of 6-8 weeks.
- Direct admitted students should confer with major professor on what to register for and how many research credits to obtain.
- Rotation information:
 - Generally, two in the fall and one in early spring. Decide by April 15. If funded for fall only, two rotations or three short rotations. Decide by Dec 1.
 - Students use these rotations to identify suitable mentor for their doctoral studies and as the same time, potential major professor evaluates students' research performance during rotation.
 - You should meet with your potential major professor to discuss expectations several times throughout your rotation.
 - To evaluate the research environment students should do all they can to learn about the lab's research interests and interact with all lab staff.
 - At the end of your third rotation (fourth **ONLY** if necessary), you will be expected to choose your major professor and in agreement join their laboratory.
 - By the end of the first academic year, students commit to a specific laboratory for doctoral students. The date of this commitment is April 15th. Once your chosen faculty member agrees to have you join their lab you need to fill out the "[Home Department for Students Admitted to Interdepartmental Majors](#)"
 - As the home department is an administrative home, BCB students are required to meet the academic requirements of the BCB major, not those their home department unless those additional requirements are associated with a co-major program of study. According to the Graduate College handbook, home departments may not impose requirements for coursework, seminars, teaching, internships, etc. beyond those of the major. However, students should strive to become integrated in the culture of their home department and to build collegial relationships with others from within and outside of their major.
- There may be special circumstances when a faculty member would like an applicant to join his or her lab directly without the student taking part in rotations. In these cases, the faculty member and student must provide a plan to the BCB Supervisory and Admissions Committees outlining the cross-disciplinary training the student will receive which is equivalent to a rotation.
- International students complete [OEET](#) by end of the 1st semester.
 - Take courses, if appropriate, to be certified as a level "1" teaching assistant.
- Familiarize yourself with the [Graduate College](#) and [Graduate Handbook](#).
- [Professional Ethics: Responsible Conduct in Research](#) can be downloaded for free at the National Academies Press website.
- All BCB core courses in which a student receives a B- or lower are not satisfactorily completed and must be repeated for graduation.
- **Adding or dropping a course** – In AccessPlus under the student tab there is a link on the left side for "Registrar Forms". This is where you add/drop your course. If you do not have a major advisor you can add the Graduate Student Service Specialist for approval.
- [As a graduate student, there is more to life than just academics](#)

ASSISTANTSHIPS AND TUITION

- You must be registered to be paid on an assistantship.
- Registration is via ACCESS PLUS.
- Go to the Student Tab. Go to Student Registration
- You can register on-line till the first day of classes
- You can make changes to your schedule on-line through the first week of classes
- After the first week or if you have not registered prior to classes beginning you will need to use an ADD/DROP slip. This form is available in most departmental offices or on the bulletin board outside of the 2014 Molecular Biology (yellow ½ sheet).
- Students who are not registered will have a HOLD placed on their payroll at the beginning of the semester
- The minimum number of credits for summer is “1” credit. **“1” credit is all you should register unless you clear it with your major professor.** Tuition in the summer is charged by credit hour
- To receive a tuition scholarship your GPA must be 3.0 or above
- Students on assistantships receive 100% tuition scholarships (Ph.D.) and 50% tuition scholarships charged at in-state rates (M.S.) provided your overall GPA is 3.0 or above.
- **How do I know when my assistantship starts and stops and how much I am being paid?**
 - You should have received a letter of intent (LOI) that describes the amount per month and the dates your assistantship begins and ends. If you do not have an LOI or the present LOI is ending soon talk to your major professor.
- All students on assistantships receive paid single health insurance.

SECOND YEAR - POSC

Program of Study Committee Appointment

After you have chosen a major professor and home department, you will, in consultation with your major professor, appoint a graduate Program of Study Committee (POSC). The composition and responsibilities of the POS Committee will be in accordance with the Graduate College guidelines as detailed in the Graduate College handbook.

The Program of Study Committee (POSC) provides oversight, advice, mentoring, and access to information and facilities. The committee is composed of faculty invited by the student to supervise their progress towards degree. The student’s major professor chairs the committee. The POSC should include faculty whose research interests can aid and complement your research interests, as well as faculty whose expertise will ensure that you graduate with a breadth of knowledge. Specific rules govern the makeup of the committee.

There are provisions to allow for co-major professors and for service of non-graduate faculty members on POS committees. For details, please consult the Graduate College Handbook – [Chapter 6](#).

Choosing a Co-Major Professor

The major professor will assist the student in choosing an appropriate co-major professor. BCB requires that the major and co-major professor (one from the biological sciences and one from the computational/quantitative sciences) actively serve as joint mentors for the student. The co-major professor must be chosen prior to filing the on-line Program of Study/Committee (POSC) form. The co-major professor should also be designated as a major professor on the POSC form. The co-major professor has an integral role in the mentoring of BCB students. Ideally, major and co-major professors have active research collaborations, and share the responsibility for funding the student (by arranging a research or teaching assistantship). BCB PhD projects typically emerge from research collaborations between the co-major professors and the student. If this is not the case, it is still expected that the co-major professor will meet regularly with the BCB student to help guide dissertation research. The selection of a co-major professor, therefore, is an important decision and should be given careful consideration.

Program of Study

The Graduate College Program of Study is one of the more important documents you will encounter while in graduate school. In essence, it is a contract between you and the Graduate College indicating the minimum course work and credits that must be taken to complete your degree (PhD or MS). No changes can be made to it without the mutual approval of the student, the Major Professor, the POS Committee, the major and when applicable co-major or minor graduate programs, along with the Graduate College.

Each student, in consultation with their POS Committee, formulates a POS, based on the curricular guidelines established by the major program, and when applicable co-major or minor programs, along with the ISU Graduate College. All the courses listed on the POS must be successfully completed to be eligible for graduation and obtaining the degree sought.

Students are advised to complete their POSC as soon as possible. The BCB Program requires its students to submit their POSC for approval by the start of the third semester, or within six months of joining their home lab. **The Graduate College requires that the POSC form must be approved by the Graduate College no later than the term before the preliminary oral examination (doctoral candidates) or final oral examination (master's candidates). In order for the POSC form to be approved in any given term, the form must be submitted to the Graduate College by the published deadline for that term.**

POSC forms are available online through AccessPlus under the Student tab, Graduate Student Status. Each student's program of study should be designed to correct deficiencies in academic preparation, allow study of subject matter that most interests the student, and avoid repetition in areas where the student is well prepared. The POS committee assures that program requirements are met before approving the POSC form.

For additional information about the POSC please reference the Graduate College Handbook – Chapter 6 and POSC website.

<https://www.grad-college.iastate.edu/handbook/>

<https://www.grad-college.iastate.edu/posc/>

- POSC committee should be selected with consultation with your advisor.
- **Ph.D. students** should set up their Committee and POSC by the end of your 1st year after choosing your major professor/home department.
 - [Graduate College POSC Committee Makeup](#)
 - Five Faculty members. Three faculty must be BCB faculty: One faculty member must be listed as “outside”; this is up to you and your major prof.
 - The “outside” faculty member can be a faculty member in BCB and/or your home department. The outside graduate faculty member(s) of the POSC provide relevant specialized knowledge or a different perspective helpful to the planning, execution, and reporting of research, or some aspect of intellectual diversity deemed important by the committee and/or major.
 - Meet with committee members prior to submitting POSC in [ACCESSPLUS](#)
 - [Required courses and seminars.](#)
 - Other courses as required by your committee.
 - Ph.D. 72 total credits
- **MS students** should set up their Committee and POSC by the beginning of their 2nd semester after selection of major professor/home department
 - [Graduate College POSC Committee Makeup](#)
 - Three faculty members. Two faculty must be BCB faculty: One faculty member must be listed as “outside”; this is up to you and your major prof.
 - The outside graduate faculty member(s) of the POS committee provide relevant specialized knowledge or a different perspective helpful to the planning, execution, and reporting of research, or some aspect of intellectual diversity deemed important by the committee and/or major.
 - MS students generally have two years to complete their degree
 - Meet with committee members prior to submitting POSC in [ACCESSPLUS](#)
 - [Required courses and seminars](#)
 - Other courses as required by your committee.
 - M.S. 32 total credits
- **Setting up your first POSC meeting:**

By the end of the first year in the major professor's laboratory, a Ph.D. student majoring in BCB must formally set up a Program of Study (POSC). To accomplish this, the student contacts committee members to select a date for a committee meeting (at least three committee members must attend for Ph.D. and two committee members for M.S. degree). One week prior to that meeting, the student must present a written basic research plan to all members of the POSC. In the written proposal, the student should provide information about educational and research backgrounds, outline basic questions to be pursued in the Ph.D. research, and indicate some of the basic research strategies to be employed and possible future directions (impact of the research). During the oral presentation, the student should carefully consider feedback from the committee members, as they often have good insights and advice for research and career enhancement. The student should coordinate with committee members unable to attend this first POSC meeting, individually providing the same oral presentation that was given to the group.

- **Good Strategies for setting up POSC meetings. Students need to realize that many professors have full schedules.**
 - Talk with major professor about possible dates, amount of time required for the meeting.
 - Identify DAYS that everyone on your POSC will be present in Ames.
 - A two-week interval several weeks in the future for initial and annual (usually 1 to 2 hours)
 - At least a month in the future for prelim and final defense seminars (usually 2 to 3 hours)
 - Identify windows (several hours) on those days when your POSC faculty are available.
 - You should identify how much time (hours) will be needed in during this part of the contact.
 - Students might opt to use an on-line free scheduling program like Doodle or finding out which hours everyone is available.
 - After the faculty respond, the student can select one or a few times when everyone appears to be free, and when a room is available for the meeting, and again solicit the opinions of the POSC members.
 - This whole process needs to be completed in one or two days so that slots that were free during the initial inquiry remain free.

- Other POSC information
 - [Undergraduate Courses on Program of Study](#)
 - POS form will list all the courses required as partial completion of your degree, those taken and those to be taken during your training.
 - Pre-requisites, core, seminars, scientific ethics, bioethics, and workshop, research and courses required by the members of your POSC.
 - To graduate you will need an overall GPA of 3.0
 - Are these courses offered now? <http://classes.iastate.edu/>
 - Catalog Descriptions will include whether the course is offered Fall, Spring, Summer. <http://catalog.iastate.edu/azcourses/>
 - **Transferability of Credits from Other Institutions.** The transferability of credits from other institutions will be determined on a case-by-case basis by the student's POSC and the BCB Chair. To waive a course requirement, students should make their case to their POSC after meeting with the instructor of the course they wish to waive. If the committee approves, the major professor (on behalf of the POSC) and the instructor of the course the student wishes to waive should agree the previously taken course covers the requirements for the course they want to waive. The memo must state that the student has already received satisfactory instruction in the subject matter covered by the required course. Credits for seminars, workshops and colloquia are not transferable.

- [Preparing for Future Faculty](#) – for those interested in a teaching career.
- [Seminars and Workshop](#) on research, grant writing, special topics, etc.

EVALUATING YOUR PERFORMANCE

Continued membership in the BCB program and financial support from the major professor or home department are contingent upon satisfactory progress towards your degree. Students are required to meet with their POS Committee at least once each calendar year. At the end of the first year, and thereafter, students will document their own progress by preparing a brief annual report of their coursework, research, exams, POS meetings, and other professional activities. This report will be emailed to you during Spring semester with a June 30 deadline.

- Grades: A cumulative GPA of at least 3.0 is required by the Graduate College for continued appointment to an assistantship
- Performance in laboratory rotations and progress in selection of a major professor (when applicable)
- Progress in initiation of your research project
- Progress in forming POS Committee, completing a Program of Study, and completion of preliminary exam
- Progress in presenting research results

A notation of progress and recommendations for continuance in the major or corrections of deficiencies are sent to the major professor and are deposited in the student's file.

SUBSEQUENT YEARS (3 – 6 year) – Preliminary Oral Exam

Dissertation Research Proposal

PhD candidates majoring in BCB must present a description of their proposed dissertation research to their POS Committees at or before the time they submit their proposed POSC. The proposal may include a written component submitted to the POS Committee prior to an oral presentation. The POS Committee will determine the length and formality of the written and oral components. Research proposal requirements, if any, for master's degree candidates are determined by their home departments.

Note: Some departments or POS Committees may require their students to present formal, detailed research proposals later in their degree program, for example, in conjunction with a formal departmental seminar, or as a part of the preliminary exam. If a POS Committee so desires, they can require an BCB student to fulfill such additional proposal requirements.

Preliminary Oral Exam

All graduate students must pass certain examinations before obtaining their advanced degrees. A preliminary oral examination is required of PhD degree students by the Graduate College. This examination should be completed by the end of your third year. Preliminary exams for students majoring in BCB must include a written component as well as an oral component. The nature of the written component is determined by the POS Committee and home department. In some departments, part of the written component is given as periodic written examinations (called cumulative exams). The Preliminary Oral Exam is given by the student to his/her POS Committee. It is the student's responsibility to arrange an appropriate date, time, and location for the oral prelim. Students request their Oral Preliminary Exam via the *Online Preliminary or Final Oral Exam Request* link as found on the Graduate College forms webpage. *This request form must be submitted to the Graduate College at least two weeks prior to the oral exam.*

Master's degree candidates are not required to take a Preliminary Examination.

Additional information about the University Oral Preliminary Exam requirement can be found in the Graduate College Handbook – [Chapter 4.4.2 Examinations](#).

Graduate College Forms https://www.grad-college.iastate.edu/common/forms/student_forms.php.

- Preliminary Oral Exam is due by the end of the third year in the program and no less than six months before final oral exam. The Prelim tests a Graduate Student's knowledge of major, minor, and supporting subject areas as well as the student's ability to analyze, organize, and present subject matter relevant to the field.
 - Breadth of knowledge in the area of BCB
 - Depth of knowledge in a student's particular research area
 - Critical thinking skills especially as they pertain to the scientific method and hypothesis-based research.
 - [Preliminary Oral Exam Request](#) (Make sure you list any co-majors, minors, or specializations on form, you cannot go back and add other majors or minors of specializations after Prelim.)
 - [Preliminary Oral Exam with Committee Member Substitution](#)
- Additional Prelim Information
 - Prelim Oral Exam should be submitted at least two weeks in advance to the Graduate College
 - Prelim form will be sent to the Graduate Program Coordinator.
 - The entire POS committee must be convened for the preliminary oral examination.
 - Each member votes their recommendation.
 - BCB requires a written component as well as the oral examination. Check with your POS committee members as to what the written component will consist of (i.e. proposal and/or questions).
 - What should I expect regarding the preliminary examination? Talk with your committee members and major professor as to what to expect.
 - Prelim Outcomes
 - Pass: committee recommends admitted to Ph.D. candidacy
 - Conditionally pass: must meet other conditions specified before recommendation
 - Fail with opportunity to repeat examination after six months
 - Fail and is not permitted to work towards a Ph.D.

- We asked students who have successfully completed their Preliminary Examinations: “More than anything else I think it is helpful to cultivate a relationship with each member on your committee. This way you can understand where they're coming from and they can do likewise of you. In the end, prelims are not solely about facts, questions or science but are instead about interactions between people. My adviser did an excellent job of helping me understand that. The most important thing I could tell new students is to get to know their committee members and ask them their expectations
- Meet annually with your POS committee after passing your prelim.
 - Record on your annual BCB checklist
 - Discuss progress or lack of progress, goals, plans for completion of thesis research
 - Discuss professional development, job opportunities
 - Three members of POSC should be present; others met independently
- Evaluations showing progress are turned in every year Spring semester. SEE PAGE 8 FOR MORE INFORMATION.

GRADUATION YEAR – Thesis and Final Oral Exam

Final Research Seminar

All students are required to present a formal, public seminar describing their completed research. The seminar must be announced *at least two weeks in advance* to the BCB faculty and students and other members of the Iowa State academic community. Please fill out the [Final Oral Information for Advertisement Submission](#) so the BCB program coordinator can advertise your seminar announcement to appropriate individuals.

The Final Oral Examination for the PhD and MS degree is an oral defense of your dissertation or thesis given by you to your POS Committee and any other faculty who wish to attend. This examination reviews the dissertation or thesis and your knowledge of relevant subjects. In many departments, the oral defense follows immediately after the Final Research Seminar. Talk to your major professor to determine the best way to schedule your Final Research Seminar in relation to your defense. It is best to schedule the final defense and research seminar well in advance.

The results of the examination are reported on the "Report of Final Examination" form that will be sent by the Graduate College directly to the program and forwarded to you and your major professor.

******Request for Final Oral Examination – must be done three weeks in advance of final.******

[Final Oral Exam Request](#)

[Final Oral Exam with Committee Member at a Distance](#)

[Final Oral Exam with Committee Member Substitution](#)

[Final Oral Exam with Student at a Distance](#)

[Final Oral Exam Conditions Met](#)

- Final Oral Checklist - [MS](#) / [PhD](#)
- Check your POSC in ACCESS PLUS in the Student Tab for “Grad Stdnt Status” to insure everything is “green”. If not, make corrections to your POSC now. Do not wait until your final defense.
- Time Limits on courses listed on your POSC. See Graduate College Handbook [6.3.4](#) for information on who can approve overage courses. All courses taken more than 7 years prior to graduation are subject to this requirement.

[Thesis checklist](#)

BCB requires that thesis be written in Journal Paper format

If your POS committee feels that the Journal Paper format is inappropriate for your thesis, this requirement can be waived by petition from your POSC to the BCB Chair if done well before you begin writing our thesis.

PREPARING FOR GRADUATION

Each semester, the Graduate College publishes the deadline dates, <https://www.grad-college.iastate.edu/calendar/>, for submission of appropriate forms and paperwork. It is a good idea for students approaching their graduation term to review this information and be sure to observe all appropriate deadlines. Early in the semester in which you expect to graduate, you must Apply for Graduation with the Graduate College through AccessPlus – Grad Student Status Page. This form indicates your intended date of graduation, exact thesis or dissertation title and other relevant information. Currently, the deadline for submitting an Application for Graduation form is within the first couple weeks of the term. If you do not graduate at the expected time, a new application must be submitted.

After the dissertation or thesis has been completed and all the other requirements have been met, except for the Final Research Seminar and Final Examination, you should consult with your major professor and POS Committee to arrange a time for the Final Research Seminar and Final Examination. You **must** also request permission from the Graduate College to schedule the Final Examination. Students request their Final Oral Exam via the *Online Preliminary or Final Oral Exam Request* link as found on the Graduate College forms webpage. *This request form must be submitted to the Graduate College at least three weeks prior to the oral exam.*

Graduate College Forms - https://www.grad-college.iastate.edu/common/forms/student_forms.php.

[Graduation Requirements](#)

Apply for Graduation through [AccessPlus](#)

- [Graduation Certification Letter](#) - Employer requests that you verify that all degree requirements have been met
- [Graduation and Commencement](#)

BCB CORE/REQUIRED COURSES

- one core course in advanced biology as determined by major professor
- three core courses in computational biology

Courses in advanced biology:

AN S 556: Current Topics in Genome Analysis (3-0) Cr. 3. Alt. S., offered even-numbered years. *Prereq:* [BBMB 405](#) or [GDCB 510](#). Introduction to principles and methodology of molecular genetics useful in analyzing and modifying large genomes.

EEOB 561: Evolutionary and Ecological Genomics (3-0) Cr. 3. S. *Prereq:* *Permission of instructor; [BCBIO 444](#) recommended.* Use of genomic and other "omic" data in evolution and ecology. Review of data-generation platforms, computational methods, and examples of how phylogenomics, metagenomics, epigenomics, and population genomics are transforming the disciplines of evolution and ecology.

EEOB 563: Molecular Phylogenetics (2-3) Cr. 3. F. *Prereq:* [BIOL 313](#) and [BIOL 315](#) An overview of the theory underlying phylogenetic analysis and the application of phylogenetic methods to molecular datasets. The course emphasizes a hands-on approach to molecular phylogenetics and combines lecture presentations with computer exercises and discussion of original scientific literature.

GDCB 511. Molecular Genetics. (Cross-listed with MCDB). (3-0) Cr. 3. S. *Prereq:* *Biol 313 and BBMB 405.* The principles of molecular genetics: gene structure and function at the molecular level, including regulation of gene expression, genetic rearrangement, and the organization of genetic information in prokaryotes and eukaryotes. (An equivalent or more advanced course may be substituted with approval of student's POS Committee.)

Core courses in computational biology:

BCB 567. Bioinformatics I (Bioinformatics Algorithms). (Cross-listed with Com S, Cpr E). (3-0) Cr. 3. F. Required *Prerequisites:* *Com S 228; Com S 330; Biol 313; credit or enrollment in Biol 315, Stat 430.* Biology as an information science. A review of the algorithmic principles that are driving the advances in bioinformatics and computational biology.

BCB 568. Bioinformatics II (Statistical Bioinformatics). (Cross-listed with GDCB, Stat, Com S). (3-0) Cr. 3. S. *Prereq:* *BCB 567, Biol 315, Stat 430, credit or enrollment in Gen 409.* Statistical models for sequence data, including applications in genome annotation, motif discovery, variant discovery, molecular phylogeny, gene expression analysis, and metagenomics. Statistical topics include model building, inference, hypothesis testing, and simple experimental design, including for big data/complex models.

BCB 570. Bioinformatics IV (Systems Biology). (Cross-listed with Com S, GDCB, Stat, Cpr E). (3-0) Cr. 3. S. *Prereq:* *BCB 567 or Com S 311; Com S 228, Gen 409, and Stat 430.* Algorithmic and statistical approaches in computational functional genomics and systems biology. Analysis of high throughput biological data obtained using system-wide measurements. Topological analysis, module discovery, and comparative analysis of gene and protein networks. Modeling, analysis, and inference of transcriptional regulatory networks, protein-protein interaction networks, and metabolic networks. Dynamic systems and whole-cell models. Ontology-driven, network based, and probabilistic approaches to information integration.

BCB PhD

Name: _____ Date: _____
 Entry Term and Year: _____ Expected Graduation Date: _____ Current GPA: _____
 POSC completed: YES / NO Prelim date: _____
 Major Prof: _____ Co-Major*: _____

*BCB requires that the major and co-major professor are both BCB affiliated faculty (one from the biological sciences and one from the computational/quantitative sciences) actively serve as joint mentors for the student.

Prerequisites – must be taken by end of their 4 th semester (summer included)	STAT 430 or variable	GR ST 565 (1 credit) End of first year to meet NIH and NSF requirements must have a “B” or better (F,S)		
BCB Core Courses grade of “B” or better Required (12 credits)	BCB 567 BCB 568 BCB 570	Advanced Biology Core Requirement: Circle the class taken: GDCB 511 AnSci 556 EEOB 561 EEOB 563		
Workshops and seminars (6 credits)	BCB 593	BCB 690 BCB 690	BCB 691	BCB 697 (F) BCB 697 (S)
Advanced Group Requirements – Electives (6 credits)	Course: Credit:	Course: Credit:	Course: Credit:	Course: Credit:
Research BCB 699 (average 36 credits)	Year 2 Fall: _____ Spring: _____ Summer: _____	Year 3 Fall: _____ Spring: _____ Summer: _____	Year 4 Fall: _____ Spring: _____ Summer: _____	Year 5 Fall: _____ Spring: _____ Summer: _____
Total (72 credits)				

ADVANCED GROUP REQUIREMENTS

In addition to the four core courses, students must complete at least six credits of advanced coursework (excluding seminars, journal clubs, rotation credits, workshop credits, or other courses that are graded on a pass / fail or satisfactory / unsatisfactory basis). Students should consult with their major professors and POS committees to determine which courses to take to fulfill this depth requirement. Ideally, the courses should provide some depth in computer science, statistics, mathematics, or the biological sciences.

WORKSHOPS AND SYMPOSIA

- **BCB 593 - Workshop in Bioinformatics and Computational Biology.** (1 cr. each time taken) (Fall, Spring, Summer) Current topics in bioinformatics and computational biology research. Lectures by off-campus experts. Students read background literature, attend preparatory seminars, attend all lectures and meet with lecturers.
- **BCB Symposium** – The BCBGSO has established a yearly symposia with funding secured by the Board of the GSO from Colleges and other funding sources. BCB provides some funding and support for the symposia as well. Major national speakers have been invited and presented. BCB Alums have also been invited and have presented.

SEMINARS

- **BCB 690 - Student Seminar.** (1 cr.) (Spring) New students take part with older students in this seminar where senior students present their research; a faculty instructor promotes discussion of experimental procedures and analysis.
- **BCB 691 - Faculty Research Seminar.** (1 cr.) (Fall) BCB faculty members present summaries of current research in their groups.

In addition, BCB students are expected to participate in a seminar series in their home department and to make an oral presentation (either in a research seminar or journal club) at least once each year.

Scientific Ethics and Good Science and Bioethics Training

The BCB-approved bioethics course is GRST 565. Responsible Conduct of Research in Science and Engineering. (1-0) Cr. 1. F.S. Prereq: Graduate classification. Ethical and legal issues facing researchers in the sciences and engineering.

BCB PROGRAM GRADE REQUIREMENT

A minimum grade requirement for the BCB core courses was instituted. Students must obtain a GPA of 3.0 in the core courses which includes courses which fulfill the Advanced Biological Requirement such as GDCB 511. The minimum grade which is acceptable in these courses is a B-.

GRADUATE MINOR

A graduate minor in BCB requires:

- completion of two core BCB courses, BCB 567, 568, or 570 (6 credits);
- Statistics 587 (3 credits);
- 1 credit each in BCB Workshop, Faculty Seminar and Student Seminar; and
- completion of 3 credits in courses listed under BCB Advanced Group Requirements. The Program of Study Committee must approve the selected courses.

In addition:

- the planned POS must be reviewed by the BCB Chair prior to POS committee approval;
- at least one member of the POS committee must be a BCB faculty member; and
- application for minor must be made prior to PhD preliminary examination.

STUDENT CODE OF CONDUCT

Academic misconduct by graduate students is taken very seriously. The more serious cases involve cheating or plagiarism on preliminary written and oral examination, thesis or dissertation. Plagiarism involves taking or passing off as one's own the ideas or writings of others. Other individual's ideas or writings should always be openly acknowledged and thoroughly referenced. Such matters of misconduct are very serious violations of academic ethics and usually result in dismissal from the University without a degree. Cheating on a course examination or plagiarism on a paper related to a course is also academic misconduct. If a graduate student is believed to have plagiarized a term paper or to have cheated on an exam, most often that situation is handled informally between the professor and the student or by a representative of the Department. The student or the faculty member may ask for more formal review by the Dean of Students' office using policies developed for ensuring that due process is followed. A formal investigation of the situation may be conducted by the Dean of Students office, a hearing held by a committee of the all-university judiciary, and a recommendation made to the Vice President for Student Affairs. The student may appeal to the Vice President for Student Affairs if he/she is not satisfied with the decision of the hearing committee.

Violations of the Student Code of Conduct can be found here: [KNOW THE CODE](#)

DISMISSAL CRITERIA

Continuing registration as a graduate student at Iowa State University is contingent upon maintaining good standing in a graduate major. The Bioinformatics and Computational Biology program expects BCB students to complete their degrees in a satisfactory and timely manner. However, there are certain situations that may require severing the relationship between a student and the BCB program.

A student may be dismissed, that is, removed from the degree program and not permitted to register as a BCB student, for the following reasons:

- **Failure to progress satisfactorily in his/her degree program**

This may be evidenced by a lack of research progress, a lack of aptitude or a failure to maintain satisfactory academic standing, as defined by the Iowa State University *Graduate College Handbook*.

- **Lack of a major professor**

Because graduate degrees in Bioinformatics and Computational Biology at ISU are centered about a mentored research project, it is impossible to complete a degree without a research mentor (major professor). To maintain good standing and earn a degree in BCB, a student must have a BCB faculty member serving as major professor.

A student admitted to BCB on rotation has up to 12 months (Ph.D.) or 6 months (M.S.) from the date of entry into the program to find a faculty member willing to serve as his or her major professor (**unless** otherwise designated at the time of admission). If the student desires assistance, the BCB Chair will help the student search for a major professor; however, final responsibility for finding a major professor rests with the student.

Occasionally, a faculty member who has agreed to serve as a major professor becomes unable or unwilling to serve. A faculty member who wishes to terminate service as major professor for a BCB student may do so by notifying the student and the BCB Chair in writing. A student who has lost his or her major professor has up to three months (after the date the BCB Chair was notified) to identify another BCB faculty member willing to serve. (In BCB, the co-major professor usually would be the logical choice to replace the major professor; if he or she agrees, a new co-major professor should be appointed.) The BCB Chair will help the student search for a new major professor, if the student desires.

DISMISSAL PROCEDURES

A student's POS committee – or, if the student has no POS committee, the student's major professor, temporary advisor, or a member of the BCB Supervisory Committee – can recommend dismissal of a student for any of the reasons listed above. Recommendations for dismissal are made to the BCB Chair and are acted on by the BCB Supervisory Committee.

Procedures for dismissal are as described in the ISU *Graduate College Handbook*. Before a dismissal is decided, the BCB Chair must give the student a written notice explaining why dismissal is being considered. The BCB Chair must also discuss the situation with the student – as well as with the POS committee, major professor, temporary advisor, and/or Supervisory Committee – in an attempt to find a satisfactory resolution. This discussion constitutes the “informal conference” as described in the *Graduate College Handbook*. If a satisfactory resolution cannot be reached and the Supervisory Committee votes to dismiss the student, either party may bring the issue to the attention of the Associate Dean of the Graduate College for a decision. The student may appeal the decision of the Associate Dean, as described in the *Graduate College Handbook*.

ACADEMIC DISHONESTY

The proper conduct of science requires the highest standards of personal integrity. Because of this, the University and BCB consider dishonesty in the classroom or in the conduct of research to be a serious offense. Students accused of academic dishonesty will be dealt with according to the procedures outlined in the *University Catalog* and the *Faculty Handbook*. Possible punishments can include dismissal from the program and expulsion from the University, depending on the severity of the offense.

REPSONSIBILITIES OF BCB AND THE MAJOR PROFESSOR

It is the responsibility of BCB to counsel students who are having academic difficulties, to help students search for an acceptable major professor or, if students are unable to overcome these difficulties, to help the students identify and apply to other appropriate degree programs. It is the responsibility of the major professor and his/her department to seek funds for a student's assistantship and for the conduct of research.

RELATIONSHIP BETWEEN STATUS IN BCB AND TERMINATION OF FINANCIAL SUPPORT

Although students in BCB are normally supported on graduate assistantships, this is not a requirement for continued participation in BCB. Students not on assistantship will continue to have regular status in the major so long as they remain in good standing and are registered.

Because assistantship support at Iowa State requires that a student be a member of a graduate program, dismissal from BCB requires that assistantship support be terminated unless the student is able to transfer to another graduate program at ISU.

Students with any doubt about their assistantship status should discuss their situation with their major professor, the department or program providing their assistantship support and/or the BCB Chair. For further information on termination of assistantship appointments, see the *Graduate College Handbook*.

In addition, termination of financial support by a major professor does not necessarily imply that the faculty member is no longer willing to serve as the student's major professor or that the student's membership in BCB will change. **Decisions regarding termination and renewal of assistantships are made by the department or program offering the assistantships, which in most cases is not BCB.** Students with any doubt about their assistantship status should discuss their situation with their major professor, the BCB Chair, and/or the department or program providing their assistantship support. For further information on termination of assistantship appointments, see the *Graduate College Handbook*.

APPEAL PROCESS

The University has established appeal processes for student grievances. These vary depending on the nature of the grievance, and are described in the *Graduate College Handbook*. Generally, these procedures begin with the program chair or the appropriate Department Executive Officer. It is usually best for all parties if a satisfactory resolution can be reached without initiating a formal appeal process. The Dean of the Graduate College is available to consult informally with students and faculty.

NONDISCRIMINATION AND AFFIRMATIVE ACTION STATEMENT

Iowa State University is an Equal Opportunity/Affirmative Action employer. All qualified applicants will receive consideration for employment without regard to race, color, age, religion, sex, sexual orientation, gender identity, genetic information, national origin, marital status, disability, or protected Veteran status and will not be discriminated against. Inquiries can be directed to the Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, 515 294-7612, email eooffice@iastate.edu

DESCRIPTION OF PROGRAM RESPONSIBILITIES

Successful completion of a Bioinformatics and Computational Biology degree requires an understanding of the roles and responsibilities of the student and various program officials. These are briefly described here, but students are encouraged to discuss these with their major professor, since expectations and standard practices may vary between research groups.

- The **Director of Graduate Education (DOGE)** is responsible for overseeing the execution of all graduate degree programs, ensuring that graduate examinations are properly conducted and that academic requirements are met upon conferring graduate degrees. The DOGE will monitor academic progress through the POSC forms and departmental progress reports, and will engage in intervention activities, as deemed appropriate.
- The **Graduate Student Services Specialist (GSSS)** will facilitate program administration and will coordinate with other university officers on matters related to academic programs, assistantships, fellowships, international status, etc. The GSSS will also serve as the primary administrative contact for students. All forms requiring DOGE signature/approval are to be submitted to the GSSS.
- The **Major Professor** will serve as the principal student advisor for all matters related to research, academics, assistantships, and overall programmatic progress. The major professor will also serve as the primary evaluator of student performance and will be assisted by the Program of Study Committee and the BCB Graduate Program Committee. Under normal circumstances, the major professor is expected to meet with each graduate student individually for at least one hour per week to discuss research progress, professional development, and other issues as might arise with the student's program. The MP is responsible for providing safe laboratory facilities and ensuring that the student has received proper training to perform work safely.
- The **Program of Study Committee (POSC)** is responsible for working with the MP to review proposal (Ph.D.) and thesis (M.S. and Ph.D.) documents and to conduct preliminary/final oral examinations. In addition, the POSC serves as a technical advisory board, available to provide advice, guidance, or recommendations regarding research activities, as appropriate. The POSC must be established using the online POSC form by the second semester of choosing a major professor. Refer to the ISU Graduate Handbook for policies regarding the make-up of the POSC.
- The **Research Assistant (RA)** is expected to engage professionally in the research activities assigned by the major professor. For a 1/2-time assistantship, a minimum of 20 hours per week of non-credit research is expected. More time may reasonably be expected under certain circumstances for fulfillment of commitments, as outlined by the MP. The RA is expected to observe professional standards with regard to attendance and notification of absences, as directed by the MP.
- The **Teaching Assistant (TA)** is expected to engage professional in the teaching activities assigned by the instructor of the course. For a 1/2-time assistantship, a minimum of 20 hours per week of non-credit teaching activities are expected. More time may reasonably be expected under certain circumstances for fulfillment of commitments, as outlined by the instructor. The TA is expected to observe professional standards with regard to attendance and notification of absences, as directed by the instructor.
- The **Graduate Student** (whether on assistantship or not) is expected to engage professionally in academic coursework and curricular research assignments (GENET 699). Students are also expected to read, understand, and follow the administrative procedures outlined in this document and the Graduate College Handbook. Graduate students are responsible for completing all required safety training and providing/maintaining appropriate records of such training, as assigned by the cognizant MP or course instructor. Students are expected to maintain the highest standards of integrity during academic, research, and reporting activities. Plagiarism, falsification, or misrepresentation of research results will not be tolerated.

HELPFUL WEBSITES

- [Bioinformatics and Computational Biology](#)
 - [POSC Progress Form](#)
 - Final Oral Checklist - [MS](#) / [PhD](#)
- [Graduate College](#)
 - [Career Services](#)
 - [Center for Communication Excellence](#)
 - [Oral English Certification Test for International TAs \(OECT\)](#)
 - [Events & Deadlines](#)
 - [Graduate College Handbook](#)
 - [Graduate Student Rights & Responsibilities](#)
 - [Graduation](#)
 - [Application for Graduation](#)
 - [Dissertations/Thesis Checklist](#)
 - [Graduation and Commencement](#)
 - [Graduation Certification Letter](#)
 - [Home Department for Students Admitted to Interdepartmental Majors](#)
 - [POSC Committee Responsibilities: A Summary](#)
 - [Preliminary and Final Exam Requirements](#)
 - [Professional Development](#)
 - [Pursuit of Master's and PhD in Same Department](#)
 - [Request to Transfer from One Major/Degree/Certificate to Another](#)
- [Iowa State University](#)
 - [Catalog, University \(Courses and Programs\)](#)
 - [Center for Excellence in Learning and Teaching \(CELT\)](#)
 - [Preparing for Future Faculty](#)
 - [Dean of Students Office \(DSO\)](#)
 - [Graduate and Professional Student Senate \(GPSS\)](#)
 - [Office of Equal Opportunity](#)
 - [Discrimination and Harassment](#)
 - [Schedule of Classes](#)
 - [Student Counseling Services](#)
 - [Student & Scholar Health Insurance Program](#)