



Bioinformatics  
and  
Computational Biology  
Interdepartmental Graduate Program

**GRADUATE STUDENT  
HANDBOOK**

FALL 2018

**IOWA STATE UNIVERSITY**

Welcome to the Bioinformatics and Computational Biology (BCB) program at Iowa State University!

This student handbook is provided to give you general guidance about important issues related to your graduate career. Because the Bioinformatics and Computational Biology interdepartmental graduate program continually seeks to improve, some changes may occur between the annual printings of this handbook. Changes will be posted on the BCB website at [www.bcb.iastate.edu](http://www.bcb.iastate.edu). You should stay in close communication with the BCB program administration and your major professor regarding important curriculum and policy issues. We also encourage you to bring questions and comments to the Chair and members of the BCB Supervisory Committee at any time.

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# I. INTRODUCTION

## *Bioinformatics and Computational Biology Interdepartmental Graduate Program*

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 56 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.

General information about the BCB program is available on our website at [www.bcb.iastate.edu](http://www.bcb.iastate.edu). The site also provides a People page which contains faculty and students in the BCB program. Links to further information on BCB faculty and students and their research interests are included in each entry.

## *Administration and Contact Information*

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

BCB Program Office  
2014 Molecular Biology Building  
515-294-5122  
[bcb@iastate.edu](mailto:bcb@iastate.edu)  
[www.bcb.iastate.edu](http://www.bcb.iastate.edu)

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**Supervisory Committee**

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Iddo Friedberg	<a href="mailto:idoerg@iastate.edu">idoerg@iastate.edu</a>	Asso. Chair, Vet Microbiology and Preventive Medicine
Karin Dorman	<a href="mailto:kdorman@iastate.edu">kdorman@iastate.edu</a>	Statistics
Marna Yandeau Nelson	<a href="mailto:myn@iastate.edu">myn@iastate.edu</a>	Genetics, Development and Cell Biology (GDCB)
Matt Hufford	<a href="mailto:mhufford@iastate.edu">mhufford@iastate.edu</a>	Ecology, Evolution and Organismal Biology (EEOB)
ex officio committee members:		
Dennis Lavrov	<a href="mailto:dlavrov@iastate.edu">dlavrov@iastate.edu</a>	Former BCB Chair, EEOB
Julie Dickerson	<a href="mailto:julied@iastate.edu">julied@iastate.edu</a>	Electrical and Computer Engineering

## II. UPON ARRIVAL AT IOWA STATE

To help in the orientation process, new students should:

- *Read this handbook.* Read the section on *Administrative Matters* during your first few days. Email is the BCB program's most important means of communication, so students should register for email as soon as possible, and then check it daily.
- Refer to the following documents and websites regularly and examine them carefully. They contain information about University regulations and requirements for graduation.

### *Graduate Student Handbooks:*

- [BCB Graduate Student Handbook](#)
- [Graduate College Handbook](#)
- [ISU General Catalog](#)

### *From the Graduate College*

#### **Orientation Website**

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

Comprehensive listing of services for academic concerns, student and community life, campus resources, and international students.

#### **Links to Important Dates and Deadlines**

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

#### **Miscellaneous forms**

Iowa State Graduate College forms are available online at:

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

#### **Thesis/Dissertation Home**

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

### *From Iowa State University*

#### **Miscellaneous forms**

Additional Iowa State University forms are available online at:

<http://www.ats.iastate.edu/forms.html>

- Other useful references include:

#### ***ISU General Catalog***

<http://catalog.iastate.edu/>

#### ***Schedule of Classes***

<http://classes.iastate.edu/>



<https://accessplus.iastate.edu/frontdoor/login.jsp>

Iowa State University's AccessPlus is a personalized secure university information resource that provides on-demand accessibility to your confidential information. Much university business for students can be handled through their AccessPlus accounts. Students can:

- print enrollment certification
- register for classes
- view/print grades
- view or print a current term or future term class schedule
- verify address and other personal information
- update in-session or interim address
- print unofficial transcript
- order official transcript
- review, accept/decline, release financial aid; sign up of direct deposit of excess funds
- view and pay university bill online; print bill information
- print 1098T tuition summary statements for tax reports
- view residence hall information
- search for jobs on and off campus
- sign up for direct deposit for payroll; view payroll information
- sign up for health insurance
- CyCash
- third party Access (grant access to a trusted third party (e.g., family member)
- ISU Alert
- degree audit information
- graduate students: view program status

#### *Iowa State University Phone/Email Directory*

<http://www.info.iastate.edu/>

The online directory is updated regularly throughout the year.

#### *Information Technology (IT) at ISU*

<http://newtoisu.it.iastate.edu/>

Register for your Net-ID; register your devices; obtain your CyMail account.

IT also provides file storage through Cy-Box, hardware checkout, and computer repair.

High performance computing resources are available through IT <http://www.hpc.iastate.edu/>.

[The IT Solution Center](#) is located in 192 Parks Library; phone: 294-4000; email: [solution@iastate.edu](mailto:solution@iastate.edu).

#### *Academic On-Line Calendars*

<http://www.registrar.iastate.edu/calendar/>

The Iowa State University homepage is at [www.iastate.edu/](http://www.iastate.edu/)



### III. GETTING STARTED – THE FIRST YEAR

#### *Upon Arrival*

Once in Ames, students may take action on these items listed on the [BCB orientation page](#). New international graduate students will want to:

- Check in with the International Students and Scholars Office (ISSO) upon arrival at Iowa State.
- Obtain a Social Security Number (please read important cautions on the BCB orientation page!).
- Register for and take the **English Placement Test (EPT)** which is required of all incoming students whose first language is not English. More information about the test is on their website, [here](#), and in this handbook.

Action items for all new graduate students (also listed on the [BCB orientation page](#)) include:

- Obtain your ISUCard.
- Establish a Net-ID (ISU email account).
- Fill out paperwork to get paid.
- Obtain an AccessPlus account so you can register for classes after talking with a BCB advisor.

#### *Graduate Student Orientation*

For new BCB graduate students, the academic year begins with a Graduate Student Orientation Week designed to ease the transition to graduate study at Iowa State. This is a time to become acquainted with the Bioinformatics and Computational Biology (BCB) program and its members and to prepare for registration and the start of classes.

In addition to participating in the BCB orientation events, students also will take part in orientation activities offered by the Graduate College and International Student and Scholars Office. Students should refer to all schedules for information about Orientation activities. Be sure to visit the BCB orientation page for many details about activities as well.

#### *Categories of Admission to BCB*

New BCB students are admitted to the program in one of three categories:

- *First year students admitted to BCB for research exploration rotations*  
New students admitted into BCB are supported during the first year on a BCB research assistantship or an NSF fellowship. They spend the first year taking classes, doing research exploration rotations, and choosing a major and co-major professor. A temporary advisor helps new students arrange rotations and choose courses to fulfill the BCB program requirements. New students do not have a "home department" until after they complete their rotations and choose a major professor, usually before the end of their second semester on campus. The student's home department is the same as that of his/her major professor.
- 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.

- *Current ISU students admitted to BCB as "transfers," "co-majors" or "concurrent degree candidates"* These students are usually supported by their major professor and/or home department. They spend their first year as BCB majors initiating an interdisciplinary research project, taking classes, and choosing a co-major professor. The major professor helps the student choose courses to fulfill the BCB program requirements. In most cases, the sections of the *BCB Graduate Handbook* dealing with temporary advisors, research exploration rotations and choosing a major professor do not apply to these students.

### ***Assignment of a Temporary Advisor***

Each new BCB student is assigned a temporary advisor who is usually a member of the BCB Supervisory Committee. Temporary advisors guide students in selecting courses during the first year, discuss research opportunities in Bioinformatics and Computational Biology, and suggest research groups/laboratories for research exploration rotations.

The major professor serves as the advisor for a new student is admitted directly to a lab without rotations, or for a current ISU student who is a transfer, co-major, or concurrent degree candidate.

### ***Registration for Classes***

During Graduate Student Orientation week, students meet with their temporary advisors or major professors to prepare class schedules for the upcoming semester. After consulting with advisors, students can register for classes through their AccessPlus accounts. If changes in course registration are necessary, course adds and drops, section changes and credit changes can be made on **ACCESSPLUS** until the end of the first week of classes.

After the first week of classes, changes in class schedules must be submitted on a *Request for Schedule Change or Restriction Waiver* form (better known as an *Add/Drop Slip*), which is available from the BCB program office or from advisors. Once signed, this form needs to be taken to Room 10, Enrollment Services, to formalize the change(s).

Students can register for future semesters through **ACCESSPLUS** after meeting with their advisor to plan their schedules. Register for classes before the beginning of the semester to avoid late registration charges. There are also charges for schedule changes after the first week of classes.

### ***Research Exploration Rotations***

An important aspect of the BCB training program is participation in Research Exploration Rotations. The main purpose of a rotation is to find a permanent home in which to conduct PhD research. Research exploration rotations also provide students an opportunity to actively participate in research projects of three BCB faculty laboratories which can promote interaction and exchange of information among BCB research groups.

A research project may be conducted during the exploration rotations, but because the rotations are necessarily brief, it may be difficult to complete a project in either a biological or computational research group. Therefore, completion of a project is not required. However, many faculty will use research productivity as one measure by which they determine whether to offer a student the

opportunity to join their laboratory. It is therefore important to allow sufficient time in your schedule to actively engage in the intellectual activities of your host lab.

For each rotation, at the minimum, students should:

- get to know the professor and the students and postdocs working in the research group;
- learn as much as possible about the professor's research projects;
- obtain "hands on" experience in one of the group's research projects;
- attend research group meetings and journal club meetings; and
- read reprints, reviews, and grant proposals related to the group's research.

If students are interested in joining a professor's lab, it is highly appropriate to convey this information to the professor and to ask about possible lab placement. However, it is best if final decisions are not made until all rotations have been completed.

Participation in research exploration rotations is required for all first year BCB students: three rotations for Ph.D. students and two rotations for M.S students. At least one rotation must be a "wet" laboratory experience (usually in a biological science laboratory using molecular biological, biophysical or biochemical techniques). At least one rotation must involve a strong computational component (usually in a research group in computer science, mathematics, physics, statistics or engineering). Students are strongly encouraged to participate in rotations in at least two different departments.

Beginning in Orientation Week, students should take advantage of and make opportunities to meet individual faculty members and discuss their research. Students should arrange appointments with the professors whose work interests them most, with some care given to financial support.

Students should make use of the following resources in selecting research groups and professors with whom to rotate:

- discussions with individual faculty members. (This is very important.) Faculty can provide information on their most recent research and grant funding; if asked, they can let students know if they have funding to take on a graduate student or if they have the space to host another graduate student;
- the list of BCB faculty who have expressed an interest in serving as mentors for research exploration rotation students, available on the BCB website and from the BCB program office;
- homepages of individual BCB faculty (see BCB website);
- research talks given by faculty in the BCB Faculty Seminar and in the various departmental seminars on campus;
- discussions with current BCB graduate students, and
- special orientation week events.

Students should compile a list of several BCB faculty with whom they would like to rotate; this can be done in consultation with the temporary advisor. Students should personally contact the faculty members to determine whether they are accepting rotation students and to schedule a rotation.

To assist both faculty and students in planning, students should attempt to schedule exploration rotations and submit a completed *BCB Research Exploration Rotation Planning Form* to the BCB office as early as possible. The deadline for submitting the *Rotation Planning* form in Fall semester is September 8.

Typically, the length of each rotation is approximately seven to eight weeks for Ph.D. students, and about six weeks for M.S. students. Adherence to the following timetable is strongly recommended. It is critical that students choose a major professor and notify the BCB office of their choice on or before the deadlines indicated.

LAB EXPLORATION ROTATION TIMETABLE		
	Ph.D.	M.S.
Deadline for submitting Rotation Planning form	September 8	September 8
Deadlines for beginning rotations:		
Rotation #1	Sept 11–Oct 27	September 18
Rotation #2	Oct 30–Dec 15	November 2
Rotation #3	Jan 8–Feb 23	n/a
Rotation #4	Feb 26–Apr 13	
Deadline for final lab decision	April 13	December 3
Deadline for filing Home Department form	April 27	December 15

If a student realizes within the first two weeks of a rotation exploration that the rotation experience is not in an area of research he or she wishes to pursue, the student should consult with their temporary advisor. The program coordinator should be informed about any changes in rotation schedules. Assistance in scheduling another exploration rotation can be provided if needed.

To satisfactorily complete BCB 697, students must submit a Rotation Evaluation form for each rotation which briefly describes their work in the rotation. Faculty will use another form to comment on the rotation experience, as well. The forms are downloadable from the Forms and Publications webpage in the BCB website.

**All BCB graduate students should register for a total of 12 credit hours each Spring and Fall semester and a total of 1 credit hour each Summer semester.**

To obtain graduate credit for research exploration rotations students should register for *BCB 697 - BCB Research Rotations* for two semesters (Ph.D. students) or one semester (M.S. students). Rotation students usually register for two to five credits of BCB 697 per semester. The number of these credits will vary according to how many other course credits are taken in fall and spring semesters.

### ***Choosing a Major Professor***

Much of the first year will be devoted to the important process of selecting a major professor. Before, during and after completing research exploration rotations, students should talk with their potential major professors to discuss the possibility of joining their laboratories. First-year BCB students must choose a major professor and notify the BCB program office of their choice **by April 13 (Ph.D.) or by December 3 (M.S.)**.

BCB faculty membership is listed on the BCB website's People page.

### **NOTE:**

- ***Students should not feel pressured to make a final decision about their future major professor until after all exploration rotations have been completed.*** BCB faculty are ***strongly*** encouraged to wait until new BCB students have had an opportunity to complete all scheduled rotations before making a commitment to any specific student. It is in the

student's best interest to reserve a final decision until becoming fully informed about all available opportunities.

- ***It is important for students to discuss their future graduate assistantship support with potential major professors.*** During the exploration rotation period, BCB students are usually supported as Research Assistants (RAs) with funds provided to the BCB program by the Graduate College. Typically, Ph.D. students receive 9 months and M.S. students receive up to 5 months of guaranteed assistantship support. After a student has chosen a major professor, responsibility for the student's assistantship funding lies with the major professor and home department. (For administrative purposes, the major professor's department becomes the student's home department.)

When a BCB faculty member agrees to serve as a student's major professor, the faculty member is expected to provide or arrange assistantship support for the remainder of the student's degree program, as long as the student remains in good standing and is making good progress toward the degree. Very few professors are able to "guarantee" a specific source of graduate assistantship support for several years. It is important, therefore, for each student to take an active role in discussing future assistantship funding with the major professor. Most students receive support as either a Research Assistant (RA) or a Teaching Assistant (TA), with funding supplied by the major professor and/or the home department. In some cases, students receive support from other sources, such as scholarships, training grants, or competitive research assistantships.

### ***Establishing a Home Department***

For administrative purposes, the major professor's department becomes the student's Home Department. After choosing a major professor, students must initiate a *Request to Establish a Home Department for Students Admitted to Interdepartmental Majors* form and submit it to the BCB administrative office. All BCB students should have filed their *Home Department* forms **by April 27 (Ph.D.) or December 18 (M.S.)**.

The *Home Department* form can be downloaded from the BCB website's Forms and Publications page. Language has been placed in Section II, after "Comments," regarding the major professor's agreement to accept the student and to provide or arrange funding. The major professor can sign the form on this line. They may also be asked by their home department to provide details of support for the student.

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.

### ***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.

### ***Appointing a Program of Study (POS) Committee***

After choosing the major and co-major professors and establishing a home department, students should begin planning a suitable program for completion of the BCB graduate coursework. Before the end of the first year, students should determine the remainder of their Program of Study (POS) Committee members through discussions with their major and co-major professors. One on-line form will be filed with the Graduate College to establish the POS Committee and to report the courses the student will take to complete his/her graduate coursework. The composition and responsibilities of the POS committee are in accordance with the Graduate College guidelines (see below).

The POS committee should include faculty whose knowledge and research interests can aid and complement the student's research interests, as well as faculty whose expertise will ensure a breadth of knowledge on the committee. **For Ph.D. candidates**, the POS committee must consist of at least five members of the Graduate College Faculty. The committee must have at least three faculty members – including the major professor and co-major professor – from within the Bioinformatics and Computational Biology major (i.e., who are members of the BCB faculty). One member of the committee must be from a different field of emphasis so as to insure diversity of perspectives.

**For M.S. candidates**, the POS committee must consist of at least three members of the Graduate College Faculty. Both the major and co-major professors must be members of the BCB faculty. One member of the committee must be either outside the major (not a BCB faculty member) or outside the student's home department.

**Concurrent degree candidates**, both M.S. and Ph.D., must meet the standard committee requirements for their Ph.D. or M.S. degree, as stated above.

Special rules govern the composition of the POS committee for **students seeking a co-major degree in BCB**:

For students seeking a **BCB Ph.D. co-major**, both the major and co-major professors must be members of the BCB faculty, with one professor affiliated with the department of the student's second major. The third member must be a BCB faculty member, and the fourth must be a faculty member of the student's second major. The fifth member can be outside both majors or in one of the two major departments or programs.

For students seeking a **BCB M.S. co-major**, both the major and co-major professors must be members of the BCB faculty, with one professor affiliated with the department of the student's second co-major. The third member can be outside both majors or in one of the two major department or program.

**BCB MAJORS**  
**GRADUATE COLLEGE REQUIREMENTS FOR COMPOSITION OF**  
**PROGRAM OF STUDY COMMITTEES\***

Below are listed the current minimum requirements for the composition of Program of Study Committees. The rules are established by the Graduate College, but are listed below for students majoring in BCB. See the [Graduate College Handbook](#) for more details.

		Ph.D.	M.S.
Major Professor	BCB faculty member	1	1
Co-Major Professor	BCB faculty member	1	1
Third Member	BCB faculty member	1	0
At least one member	Different Field of Emphasis	1	1
Additional Members	No Restrictions*	1	0
<b>Total Members</b>		<b>5</b>	<b>3</b>

\* All POS committee members must be members of the Graduate Faculty.

After decisions about the committee and coursework are made, file the electronic POSC form. It is good practice to review the form before submission with the BCB Program Coordinator. “Bioinformatics and Computational Biology” should be listed as “Major”; home department (major professor’s department) should be listed as “Department.” The form will route to the POS committee members, then to the major professors, and then to the Chair of the program who is the Director of Graduate Education (DOGE) for the BCB major. Once approved, the form will route to the Graduate College. Students can monitor the progress of their on-line POSC on their AccessPlus graduate student screen, as it moves through the committee and BCB chair.

***BCB Program Annual Student Review***

The Graduate College requires Graduate Programs to do annual reviews of their graduate students. Directions will be given to students as to what document(s) they should provide to the program for their BCB Annual Review. Potentially, an interview with the BCB program chair will take place. Continued membership in the Bioinformatics and Computational Biology program and financial support is contingent upon satisfactory progress towards the degree.

BCB students can expect to be asked to complete annual survey reports so the BCB Program can monitor student progress. For 2017-2018, students used the ***BCB Program Requirements Checklist*** ([see the Forms section](#)) to track progress toward meeting BCB program requirements.

## IV. ACADEMIC MATTERS

### *Degrees Offered*

The Bioinformatics and Computational Biology graduate program is designed to provide doctoral (Ph.D.) level training. In certain circumstances, students may be admitted as M.S. candidates. The M.S. degree is not a prerequisite for the Ph.D. program.

Students who are admitted to the Ph.D. program and who later wish to transfer to the M.S. program must make the transfer concomitant with selection of a major professor (before the start of the second year). Students will be financially responsible for their education after the transfer. Transfers after the first year require approval of the BCB Supervisory Committee.

Students who are admitted to the M.S. program and who wish to transfer to the Ph.D. degree program in BCB may request to do so. Applications for transfer are judged on the basis of the same criteria as new applications for admission to the Ph.D. program. Students who wish to enter the Ph.D. program in BCB after completion of the M.S. degree in BCB must reapply to the program. Such applications are judged on the basis of the same criteria as new applications to the BCB Ph.D. program.

### *Academic Calendar*

The BCB graduate program is a year-round program that includes Fall, Spring and Summer semesters. ***Students are expected to be registered and to participate in research and courses twelve months per year.*** A rotating student may take vacation with the approval of his or her temporary advisor and by notifying the BCB Program Coordinator. ***Each student must obtain the required approval and notify the BCB office prior to travel,*** in order to avoid potential interruption of graduate assistantship support and/or visa problems. See *Leave* in the *Benefits* section of this Handbook for information regarding vacation.

### *Research Expectations*

BCB students are trained to develop an independent and creative approach to science through an integrated curriculum and interdisciplinary research projects in the fields of bioinformatics, computational biology, and biological statistics.

***Advanced degrees in BCB require that a student's research project be interdisciplinary, including both biological and quantitative/computational novel components.*** The POS committee is responsible for determining whether a student's research project meets this condition.

According to the Graduate College Handbook: "A doctoral dissertation must demonstrate conclusively the ability of the author to conceive, design, conduct, and interpret independent, original, and creative research. It must attempt to describe significant original contributions to the advancement of knowledge and must demonstrate the ability to organize, analyze, and interpret data. In most instances, a dissertation includes a statement of purpose, a review of pertinent literature, a presentation of methodology and results obtained, and a critical interpretation of conclusions in relation to the findings of others. When appropriate, it involves a defense of objectives, design, and analytical procedures. Dissertation research should be worthy of publication and should appear in appropriate professional journals or in book form.



Since satisfactory completion of the thesis or dissertation can constitute one of the most gratifying experiences in graduate study, the document should reflect the highest standards of scholarship, serving as a measure of quality for the student, major professor, the program, and Iowa State University.

Responsibility for writing and editing of the thesis or dissertation rests with the student, under the supervision of the major professor, and not with the Graduate College. The Graduate College does not permit joint authorship of theses or dissertations. It is the responsibility of the major professor to supervise the preparation of preliminary and final drafts of the thesis or dissertation, so as to assure the highest level of quality when the student presents the thesis or dissertation to the committee for final approval.”

For information on Graduate College rules and procedures regarding dissertations, see their Thesis web pages, [here](#). Links to the pages can also be found on the BCB Website’s [forms and publications page](#).

In BCB, the Ph.D. thesis is expected to be done in the Alternate Format which includes approximately three published or publishable original manuscripts. For additional details, see *Writing the Thesis* in the *Progressing Through the Degree Program* section of this Handbook.

The Ph.D. and M.S. degrees are usually completed in five and two years, respectively.

### ***Academic Preparation – Background Courses***

The foundation disciplines for BCB are genetics, molecular biology, mathematics, computer science, statistics and physics. Students entering the BCB program are expected to have a strong undergraduate background in at least **one** of these disciplines and additional coursework in another.

The following table summarizes the three areas in which BCB majors must demonstrate basic competence. Students are strongly encouraged to take courses equivalent to the ISU courses listed **prior** to enrollment in the BCB program, but will have the opportunity to take courses appropriate for their background to prepare for BCB core coursework during the first year of BCB graduate training. The temporary advisor or major professor helps each student determine the background courses needed. The student's POS committee will evaluate competence in the three background areas during the student's second Annual POS Committee meeting.

### ***Background Courses (or equivalent) for Admission to BCB and as preparation for BCB Core courses***

<b>Category I. Mathematics and Statistics</b>
<b>Math 265. Calculus III.</b> (4-0) Cr. 4. F*.S.SS.Prereq: Grade of C- or better in 166 or 166H. Analytic geometry and vectors, differential calculus of functions of several variables, multiple integrals, vector calculus.
<b>Stat 341. Introduction to the Theory of Probability and Statistics I.</b> (3-0) Cr. 3. F.S.Prereq: Math 265 (or 265H). Probability; distribution functions and their properties; classical discrete and continuous distribution functions; multivariate probability distributions and their properties; moment generating functions; simulation of random variables and use of the R statistical package.

**STAT 342. Introduction to the Theory of Probability and Statistics II**

*Prereq:* [STAT 341](#); [MATH 207](#) or [MATH 317](#)

Transformations of random variables; sampling distributions; confidence intervals and hypothesis testing; theory of estimation and hypothesis tests; linear model theory; use of the R statistical package for simulation and data analysis.

**STAT 401 (now 587): Statistical Methods for Research Workers**

(3-2) Cr. 4. F.S.SS. *Prereq:* [STAT 101](#) or [STAT 104](#) or [STAT 105](#) or [STAT 201](#) or [STAT 226](#)

Graduate students without an equivalent course should contact the department. Methods of analyzing and interpreting experimental and survey data. Statistical concepts and models; estimation; hypothesis tests with continuous and discrete data; simple and multiple linear regression and correlation; introduction to analysis of variance and blocking.

**STAT 447 (now 588): Statistical Theory for Research Workers**

(4-0) Cr. 4. F.S.SS. *Prereq:* [MATH 151](#) and permission of instructor, or [MATH 265](#)

Primarily for graduate students not majoring in statistics. Emphasis on aspects of the theory underlying statistical methods. Probability, probability density and mass functions, distribution functions, moment generating functions, sampling distributions, point and interval estimation, maximum likelihood and likelihood ratio tests, linear model theory, conditional expectation and minimum mean square error estimation, introduction to posterior distributions and Bayesian analysis, use of simulation to verify and extend theory. Credit for both STAT 341 and STAT 447 may not be applied toward graduation.

**STAT 430: Empirical Methods for the Computational Sciences**

(3-0) Cr. 3. F. *Prereq:* [STAT 330](#) or an equivalent course, [MATH 166](#), knowledge of linear algebra.

Statistical methods for research involving computers; exploratory data analysis; selected topics from analysis of designed experiments - analysis of variance, hypothesis testing, interaction among variables; linear regression, logistic regression, Poisson regression; parameter estimation, prediction, confidence regions, dimension reduction techniques, model diagnostics and sensitivity analysis; Markov chains and processes; simulation techniques and bootstrap methods; applications to computer science, bioinformatics, computer engineering - programs, models and systems as objects of empirical study; communicating results of empirical studies. Statistical software: R.

**Category II. Biological Sciences**

**Biol 313. Principles of Genetics.** (Cross-listed with Gen). (3-0) Cr. 3. F.S. Prereq: 211, 211L, 212, and 212L. Introduction to the principles of transmission and molecular genetics of plants, animals, and bacteria. Recombination, structure and replication of DNA, gene expression, cloning, quantitative and population genetics.

**Biol 315. Biological Evolution.** (3-0) Cr. 3. F.S. Prereq: 313. The mechanisms of evolution. Topics in microevolution: population genetics, natural selection, genetic variation, and adaptation. Macroevolution: speciation, extinction, phylogeny, and major evolutionary patterns.

### Category III. Computer Science

**COM S 227. Introduction to Object-oriented Programming.** (3-2) Cr. 4. F.S. *Prereq:* Placement into Math 143, 165, or higher; *recommended:* a previous high school or college course in programming or equivalent experience. Introduction to object-oriented design and programming techniques. Symbolic and numerical computation, recursion and iteration, modularity procedural and data abstraction, and specifications and subtyping. Object-oriented techniques including encapsulation, inheritance and polymorphism. Imperative programming. Emphasis on principles of programming and object-oriented design through extensive practice in design, writing, running, debugging, and reasoning. Course intended for Com S majors. Credit may not be applied toward graduation for both Com S 207 and 227.

**COM S 228. Introduction to Data Structures.** (3-1) Cr. 3. F.S. *Prereq:* Minimum of C- in 227, credit or enrollment in Math 165. An object-oriented approach to data structures and algorithms. Object-oriented analysis, design, and programming, with emphasis on data abstraction, inheritance and subtype polymorphism. Abstract data type specification and correctness. Collections and associated algorithms, such as stacks, queues, lists, trees. Searching and sorting algorithms. Graphs. Data on secondary storage. Analysis of algorithms. Emphasis on object-oriented design, writing and documenting medium-sized programs. This course is designed for majors.

**Com S 230. Discrete Computational Structures.** (3-1) Cr. 3. F.S. *Prereq:* C- or higher in 228, C- or higher in Math 166 and Engl 250. Concepts in discrete mathematics as applied to computer science. Logic, proof techniques, set theory, relations, graphs, combinatorics, discrete probability and number theory.

#### *Required Core Courses*

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

#### *Examples of core courses in advanced biology:*

**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.)

**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.

**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.

***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). Some courses used in the past to fulfill this depth requirement are below. 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.

**COURSES THAT FULFILL ADVANCED GROUP REQUIREMENTS**

This is a list of Advanced Group Requirement courses taken by current BCB students. POS committees in BCB should discuss and approve course selections by their BCB students to fulfill this requirement for the BCB program.

Agron 561 - Population and Quantitative Genetics for Breeding  
Agron 528-Quantitative Genetics for Plant Breeding  
AnS 540 - Livestock Immunogenetics  
B M S 575 - Cell Biology  
BBMB 404 - Biochemistry I  
BBMB 504 - Amino Acids and Proteins

BBMB 510 - Molecular Biology & Biochem of RNA  
BCB 585X - Data Tecnol St Anly;  
BCB 590 - Intro to Next Gen Sequencing  
BCB 660 - Applications of NGS data processing software in genomics  
BCB/BBMB 542A – Intro. to Molecular Biology Techniques: DNA Techniques

BCB/BBMB 542B – Intro. to Molecular Biology  
Techniques: Protein  
BCB/BBMB 542C – Intro. to Molecular Biology  
Techniques: Cell Techniques  
BCB/BBMB 542E – Intro. to Molecular Biology  
Techniques: Proteomics  
BCB/BBMB 542F – Intro. to Molecular Biology  
Techniques: Metabolomics  
ComS 106 – Intro to Web Programming,  
ComS 207  
Com S 363 – Intr Databs Mgt Sys  
ComS 424X – Intr Hi Prfm Cmputing  
ComS 477 – Problem Solving Tech for Applied  
ComS  
ComS 551 – Genome Assembly and Analysis  
ComS 572 – Prin Artifcl Intell  
ComS 573 – Machine Learning  
ComS 673 – Adv Topics in Computational  
Intelligence  
Cpr E 526 – Intr Parallel Algorithms &  
Programming  
CprE528-Problstc Mthd CprE  
EE 525X – Data Anlytc Ele&Cpr  
EE 526X, Deep Learning  
EE571-Intro Convex Optimization  
EEOB 507 Adv Animal Behavior  
EEOB 546X – Comp Skil Biol Data  
EEOB 561 – Evol&Ecol Genomics  
EEOB 563 – Molec Phylogenetics  
EEOB 567 – Empiric Popul Genetics,  
GDCB 510-Transmissn Genetics,  
GDCB 513-Plant Metabolism,  
GDCB 533-Advncs Develtl Biol;  
GDCB 545-Plant Molec&Dev Bio;  
Gen 340-Human Genetics;  
Gen 409 – Molec Genetics;  
GRST 585 – Ethics  
GRST 586 Prep Futr Fac Sm II  
GRST 588 FutreFac  
IE 534 – Linear Programming  
Math 207 Matrices and Linear Algebra

Math 265 – Calculus III  
Math 407 – Appl Linear Algebra;  
Math 424-Intr Hi PrFM Cmputg;  
Math 501 – Intro Real Analysis  
Math 554-Intro Stochast Proc;  
Math 561 Numericl Analysis I;  
Math 562 Numericl Analysis II;  
Math 565 – Continuous Optimiza;  
ME 600 – Seminar  
Micro 408-Virology  
Phys 561-Phys of Biomolecule  
Stat 330-Probab&Stat Com Sci;  
Stat 341–Intr to the Theory of Probability and Stat I  
Stat 342-Intr to the Theory of Probability & Stat II  
Stat 401 – Stat Meth for Rsrch;  
Stat 402 – Stat Design and the Analysis of  
Experiments  
Stat 407-Multivariate Analys,  
Stat 416 Dsgn Gene Exprs Exp;  
Stat 430 Emprcl Mthd Cmp Sci  
Stat 444-Bayesian Data Analy;  
Stat 447 Stat Theory for Res;  
Stat 500, Statistic Methods  
Stat 501-Multivar Stat Methd;  
Stat 503-Explor Mth&Data Min,  
Stat 510 – Stat Methods II  
Stat 516-Dsgn Gene Exprs Exp,  
Stat 520 – Statistcl Mthods III  
Stat 542 – Thry Pobab&Stat I,  
Stat 543-Thry Probab&StatII,  
Stat 544-Bayesian Stat;  
Stat 554 – Intro Stochast Proc;  
Stat 557-Mthd Cnts&Proportns,  
Stat 579 – An Intro to R,  
Stat 580-Stat Computing,  
Stat 601-Adv Stat Methds,  
Stat 611-Thy&AppLinearModl,  
Stat 644-Adv Bayesian Theory;  
Stat, 568-Adv Genome Informtc,  
V MPM 608 – Molecular Virology

### ***Required Seminars and Activities***

#### *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

BCB students are required to take BCB-approved bioethics courses or course modules. Students seeking M.S. degrees are required to take at least one BCB-approved bioethics course/module (0.5 credit minimum). Ph.D. students are required to take at least two bioethics modules or another BCB-approved bioethics course (1 credit minimum). *If a general scientific ethics seminar is offered during Fall orientation, this does not replace the bioethics course requirement.* Students supported by special training grants may have additional bioethics training requirements.

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.

Please see Courses Offered ([www.bcb.iastate.edu/courses-offered](http://www.bcb.iastate.edu/courses-offered)) under the Current Student tab on the BCB website for additional information.

### Language Requirements

Language requirements are determined by the student's Program of Study Committee.

### Graduate English Requirements for Nonnative Speakers of English

The **English Placement Test for Non-Native Speakers of English (EPT)** is required for all incoming students whose first language is NOT English, and who do not meet any of the exemption categories. This test is administered by the Department of English. It must be taken in addition to TOEFL (Test of English as a Foreign Language), which is required as part of the admissions process. The English Placement Test should be taken at the beginning of the first semester of enrollment.

New international students should check in with the International Students and Scholars Office (ISSO) and then register for the exam. Students who do not pass one or more sections of the test will be placed in [ESL courses](#) based on their results.

Here are the exemptions as listed on the [EPT website](#) -- if you meet one of these criteria, you do not need to take the test and you do not need to notify anyone:

- Students who have received a bachelor's, master's or Ph.D. degree from an English-speaking university. As of 2018 these are the countries that ISU considers "English-speaking": the U.S., Canada, United Kingdom, Ireland, New Zealand, or Australia.
- Students with a TOEFL score of 640 or above (paper-based TOEFL) or 105 and above (internet-based TOEFL);
- Student with a score of 8.0 or above on the IELTS;



### Teaching Requirements

Teaching requirements are determined by the major rather than home department. All BCB graduate students are encouraged to participate in teaching seminars and obtain teaching experience as part of their training.

### Testing of Nonnative Speaking Students Who Teach

All international graduate students who are offered or considered for a teaching assistantship are required to take the **Oral English Certification Test (OECT)**. The purpose of OECT is to determine whether ITA candidates meet the oral English language proficiency requirements and whether they need additional language training. Their website which includes information on who is exempt is [here](#).

The OECT consists of 2 parts - the Oral Proficiency Interview (OPI) and the TEACH. The OPI is a modified version of [ACTFL OPI](#) which is recognized by the American Council on Education (ACE) for the awarding of college credit and is used by academic institutions worldwide. The TEACH is a short simulation in the form of a mini-lecture on a teaching topic.

Test-takers' performance is scored by 3 raters. The raters individually assign a score for the overall comprehensibility and effectiveness of each test-taker's performance on the OPI and TEACH. The results are reported to students and departments as one of 4 possible levels of certification: Fully certified (Level 1); Conditionally certified (Level 2); Certified with restrictions (Level 3); Not certified (Level 4).

Students in these four levels are appointed to different teaching duties. Potential ITAs who demonstrate sufficient English proficiency on the TOEFL IBT, IELTS, or PTE-Academic are exempt from taking one or both sections of OECT. For detailed exemption criteria, see [Who Needs to Take OECT](#).

### ***Additional Research Training Opportunities***

#### Participation in International Scientific Conferences and Symposia

Attendance and presentation of research results at professional meetings are an essential part of the BCB graduate training program. Students should attend at least one national or international meeting during their degree program. All BCB students are eligible for financial assistance from the BCB program (as well as from other ISU sources) for conference-related expenses. For additional information, see *Grants for Professional Travel* in *Section VII. Financial Matters*.

#### Internships

BCB students are encouraged to participate in industrial internships as part of their training for careers in industry, government or the public sector. Recent internships for students have taken place with Merck, Syngenta and Novartis. In the past, Pioneer Hi-Bred International has offered Graduate Research Fellowships with an eight week internship during the summer of a student's first year of study. Additional internships in subsequent years were arranged between the student and Pioneer. For additional information, please refer to the BCB website.

#### International Experiences

BCB students are encouraged to enrich their educational experience and establish international contacts by participating in international research experiences. The BCB program has had working relationships with four institutions (three in Europe and one in China) with which international training experiences were arranged in the past. Speak with your major professor about arranging these opportunities.

<b>SUMMARY OF BCB REQUIREMENTS BY DEGREE – FALL 2018</b>				
<b>Requirement</b>	<b>Course Number (Semester Offered)</b>	<b>Course Name</b>	<b>Ph.D.</b>	<b>M.S.</b>
Background coursework	Stat 430 (F) or Variable	Empirical Methods for Computer Science Or Variable	4-6 cr.	3 cr.
BCB core courses	(a) BCB 567 (F)	Bioinformatics Algorithms	3 cr.	3 cr.
	(b) BCB 568 (S)	Statistical Bioinformatics	3 cr.	3 cr.
	(d) BCB 570 (S)	Systems Biology	3 cr.	3 cr.
Advanced Biology Core requirement	Variable	GDCB 511, Molecular Genetics AnSci 556, Current Topics in Genome Analysis EEOB 561, Evolutionary and Ecological Genomics EEOB 563, Molecular Phylogenetics	3 cr.	3 cr.
Advanced group requirements	Variable	Variable	6 cr.	6 cr.
Workshops and symposia	BCB 593 <sup>d</sup>	BCB Workshop	1 time	1 time
Student research seminars	BCB 690 (S)	BCB Student Research Seminar	2 times <sup>b</sup>	1 time <sup>c</sup>
Faculty seminars	BCB 691 <sup>d</sup> (F)	BCB Faculty Research Seminar	1 time	1 time
Research rotation (first year only)	BCB 697 (F S)	BCB Research Rotations	3 labs	2 labs
Research	BCB 699 (F S SS)	Research	Variable cr.	6 to 9 cr.
Bioethics training	Fall	Fall Scientific Ethics Workshop if offered and	1 session and	1 session and
	Var. (usually S)	BCB-approved bioethics course/modules	1 cr.	0.5 cr.
Graduate English	Variable	(for nonnative speakers only) Determined by placement exam	√	√
<b>Total Credit Hours</b>			<b>75</b>	<b>35.5</b>

a [BCB 593](#) Workshop is offered various semesters (F S SS), but at least once each year.

b Student must make at least two oral presentations.

d As of Fall 2017, students will be required to take it once.

### ***BCB Program Grade Requirement***

In Fall 2009, 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, 569 or 570 (6 credits);
- Statistics 430 (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.



### ***Co-major or Concurrent Degree Requirements***

Students who are admitted to the BCB program as co-major or concurrent degree candidates must fulfill both the requirements of the BCB program and those of the co- or concurrent degree program. Seminar requirements for co-majors may be modified as follows if the POS committee and BCB chair agree: Co-majors may take just one BCB student seminar (BCB 690) if the other major requires a student seminar. See the *Graduate College Handbook* for additional information.

### ***Summary of First Year Course Requirements for BCB Majors***

All first-year Ph.D. and M.S. degree candidates must:

- take part in 3 research rotations (2 for Masters)
- take 4 to 6 courses to complete *BCB Background Coursework Requirements*
- take a BCB core course, BCB 567 and/or BCB 568, if appropriate background coursework is in place, and if the temporary advisor approves;
- attend *BCB 691 - BCB Faculty Research Seminar* (Fall);
- participate in *BCB 690 - BCB Student Research Seminar* (Spring);

After the First Year Students should

- Register for *BCB 699 - Research* (rather than *BCB 697 - Research Rotation*) every semester. Number of credits will vary depending on other courses taken; students should register for a total of 12 credits every Fall and Spring semester, and 1 credit every Summer semester.
- Participate in *BCB 593 - BCB Workshop* (Fall or Spring).
- Fulfill the BCB Bioethics training requirement.
- Register for courses to complete Advanced Group Requirements, following the recommendations of their major and co-major professors and POS committee.
- Refer to the Summary of BCB Requirements (above) for specific credit hour requirements for seminars, workshops, etc.

### ***Sample Programs for First- and Second-Year BCB PhD Students***

For students with prior training in computer science and biological sciences, but needing Statistics preparation:

<b>Year 1</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
Stat 401 (now Stat 587)	3	Stat 447 (now Stat 588)	3
BCB 567 - Algorithmic Informatics	3	BCB 690 - Student Seminar	1
BCB 691 - Faculty Research Seminar	1	Adv. Biol. Core Requirement	3
BCB 697 - Research Rotation	5	BCB 697 - Research Rotation	5
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

<b>Year 2</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
Advanced Elective Requirement	3	BCB 568 - Statistical Bioinformatics	3

BCB 593 - Workshop (if offered)	3	BCB 570 - Systems Biology	3
BCB 699 - Research with Major Professor	1	GR ST 565 – Ethics Requirement	1
	7	BCB 699 - Research With Major Professor	5
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

\* [BCB 593](#) Workshop is offered various semesters (F S SS), but at least once each year

For students with prior training in computer science and statistics but needing biology preparation:

<b>Year 1</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
Biol 313	3	Biol 315	3
Stat 430	3	BCB 568 - Statistical Bioinformatics	3
BCB 691 - Faculty Research Seminar	3	BCB 690 - Student Seminar	3
BCB 697 - Research Rotation	3	BCB 697 - Research Rotation	3
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

<b>Year 2</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
BCB 567 - Bioinformatics I	3	Adv. Biology Core Requirement	3
BCB 593 Workshop	1	BCB 570 - Bioinformatics IV	3
Advanced Elective Requirement	3	GR ST 565 - Ethics Requirement	6
BCB 699 - Research With Major Professor	5	BCB 699 - Research With Major Professor	
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

\* [BCB 593](#) Workshop is offered various semesters (F S SS), but at least once each year

Two examples for students with strong Biology, but needing computer science preparation:

<b>First Example -Year 1</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
Com S 227	3	Com S 228	3
Stat 430	3	Com S 230	3
BCB 691 - Faculty Research Seminar	1	BCB 690 - Student Seminar	1
BCB 697 - Research Rotation	5	BCB 697 - Research Rotation	5
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

<b>Year 2</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
BCB 567 - Bioinformatics I	3	BCB 568 - Bioinformatics II	3
Advanced Elective Requirement	3	BCB 570 - Bioinformatics IV	3
BCB 593 Workshop	1	GR ST 565 - Ethics Requirement	1
BCB 699 - Research with Major Professor	5	BCB 699 - Research With Major Professor	5
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

\* [BCB 593](#) Workshop is offered various semesters (F S SS), but at least once each year

<b>Second Example -Year 1</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
Com S 228	3	Com S 230	3
Stat 430	3	Adv. Biol Core Requirement	3
		GR ST 565	1
BCB 697 - Research Rotations	6	BCB 697 - Research Rotations	5
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

\* [BCB 593](#) Workshop is offered various semesters (F S SS), but at least once each year

<b>Year 2</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
BCB 567 - Bioinformatics I	3	BCB 568 - Bioinformatics II	3
Com S 311	1	BCB 570 - Bioinformatics IV	3
BCB 699 - Research with Major Professor	8	BCB 699 - Research with Major Professor	6
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

For students with strong Biology, but needing computer science and Statistics preparation:

<b>Year 1</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
Com S 227	3	Com S 228	3
Stat 401 (now Stat 587)	3	Stat 447 (now Stat 588)	3
BCB 691 - Faculty Seminar	1	BCB 690 - Student Seminar	1
BCB 697 - Research Rotation	5	BCB 697 - Research Rotations	5
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

<b>Year 2</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
Advanced Elective Requirement	3	BCB 568	3
Com S 230	3	Adv Biol Core Requirement	3
BCB 593 Workshop	1	BCB 699 - Research With Major Professor	6
BCB 699 - Research with Major Professor	5		
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

\* [BCB 593](#) Workshop is offered various semesters (F S SS), but at least once each year

<b>Year 3</b>			
<b>Fall Semester</b>	<b>Credits</b>	<b>Spring Semester</b>	<b>Credits</b>
BCB 567 - Bioinformatics I	3	BCB 570 - Systems Biology	3
Advanced Elective Requirement	3	Advanced Elective Requirement	3
BCB 699 - Research with Major Professor	6	BCB 699 - Research With Major Professor	6
<b>Total Credit Hours</b>	<b>12</b>		<b>12</b>

## V. PROGRESSING THROUGH THE DEGREE PROGRAM

Links to forms referenced in this section can be found on the [Forms and Publications](#) page of the BCB Website as well as through links in this on-line handbook. Many forms are also available on the Graduate College's website. The forms page of their website is currently located [here](#).

The below table summarizes the coursework requirements of the BCB program and provides a timetable for completion of degree requirements. ISU Graduate College requirements for the Ph.D. and M.S. degrees are summarized in the [ISU Graduate College Handbook](#).

BCB REQUIREMENTS TIMETABLE AND DEADLINES		
	PhD	MS
Attend Lab Safety Training	Orientation week	Orientation week
Take Graduate English Examination (for nonnative speakers only)	Orientation week	Orientation week
Start rotation 1	September 11	September 11
Start rotation 2	October 30	October 30
Start rotation 3	January 8	Not applicable
Make major professor decision	April 13	December 3
File Home Department form	April 27	December 15
File Committee Appointment form	Before end of 1 <sup>st</sup> year	Before end of 1 <sup>st</sup> year
Hold first POS Committee meeting and file POS form	By 1 <sup>st</sup> semester of 2 <sup>nd</sup> year	Before end of 1 <sup>st</sup> year
Hold annual POS meeting	Each subsequent October	Each subsequent October
Take Oral English Certification Test	Int'l: At least 1 semester prior to expected TA	Int'l: At least 1 semester prior to expected TA
Take preliminary examination (At least two Core courses must be taken before this exam)	By 1 <sup>st</sup> semester of 3 <sup>rd</sup> year	Not applicable
Submit thesis to POS committee	2 weeks prior to defense	Not applicable
Provide research seminar information*, title and abstract to BCB office	2 weeks prior to seminar	Not applicable

\*1414 Molecular Biology Building is available to BCB on Wednesdays at 4:10 for BCB seminar presentations. If your POS committee is available at this time and on this day, check with the program coordinator to reserve this room for your presentation.

### ***First Year Activities***

Activities completed during a student's first year in the BCB program are described in *Section III. Getting Started – The First Year*.

### ***Approval of the Program of Study (POS)***

After selection of their major and co-major professors, students should begin planning a suitable program for completion of the BCB graduate coursework. Forming a POS Committee and filing the Program of Study form are done electronically in one form. The Graduate College *Program of Study/Committee* (POSC) form serves as a contract between the student and the Graduate College, indicating the minimum coursework that must be completed for the Ph.D. or M.S. degree.

Students should prepare a tentative *Program of Study* in consultation with their major professor and arrange a meeting of their POS committee to discuss the proposed *Program of Study* and research plans. All committee members must be present. The student's first Annual Progress Report is also reviewed at this meeting (see below).

In preparing the *Program of Study*, the student and major professor should refer to the BCB course requirements to ensure that the planned coursework: 1) meets all BCB requirements, 2) meets all Graduate College requirements, and 3) is appropriate, based on the student's planned research project. The POS committee will approve the POS form if these conditions are met. If courses listed on the POS form do not meet all BCB course requirements, the POS form will NOT be approved by the BCB program chair (unless a justification is provided within the POSC by the major professor).

### ***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 POS committee and the BCB Chair. To waive a course requirement, students should make their case to their POS committee after meeting with the instructor of the course they wish to waive. If the committee approves, the major professor (on behalf of the POS committee) and the instructor of the course the student wishes to waive should agree the course to make sure the . 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.

### ***Tips for Scheduling POS Meetings***

Scheduling POS committee meetings can be challenging, but there are ways to simplify the task. In consultation with the major professor, the student should select four or five potential meeting timeslots, and then email the other POS committee members asking which times they could be available to meet.

Following the advice of the major professor, the student should indicate the expected duration of the planned meeting (usually about one hour) in the email message to POS committee members. This email request should be sent *several weeks prior* to the proposed date of the first POS meeting. Arrangements for the Preliminary Exam and Final Defense (which require longer time slots) should be made *at least one month in advance*. After obtaining faculty responses, the student should select a time when everyone can meet, reserve a conference room, and notify the POS committee members of the date, time, and location of the meeting. *The whole scheduling process should be completed within two to three days so that timeslots available during the initial inquiry remain available*. Email is the most efficient means of scheduling these meetings.

It is important (and courteous) to send an email reminder of the meeting time and place to POS committee members *two to three days prior* to the scheduled meeting.

### ***First POS Committee Meeting***

In most cases, a student's POS form is approved during the first POS committee meeting. **Approval of the POS must be obtained before the end of the first semester of the student's second year (Ph.D.) or before the end of the first year (M.S.)**

***At least one week prior to the scheduled POS committee meeting, students should prepare the following documents:***

- Proposed POSC form
- Description of Proposed Research

The Description of Proposed Research should be concise (usually 2-3 pages) and summarize the major objectives of the research project and planned approaches to achieve these objectives. Because the POS must be approved soon after the student has chosen a major professor, the research description

is expected to be preliminary; it is understood that the student's plans may change as the research progresses. The written proposal should be viewed as a tool to help the student plan the dissertation or thesis research and to aid the POS committee members in evaluating whether the proposed POS coursework is appropriate. *The research project of BCB students must be interdisciplinary, comprised of both biological and computational/mathematical novel components.* The Description of Proposed Research should be emailed to the committee members one week prior to the first meeting.

Students should be prepared to make a brief oral presentation at the first POS committee meeting. Typically, the student describes his or her academic background (undergraduate institution, previous degrees, research experience, research interests, career goals) during the first few minutes of the meeting. The student then briefly summarizes the proposed research and solicits input from committee members.

The POS committee is responsible for ensuring that the proposed research project is interdisciplinary, including both biological and computational/mathematical novel components. In addition, the POS committee is responsible for ensuring that the POS coursework: 1) meets all BCB requirements, 2) meets all Graduate College requirements, and 3) is appropriate, based on the student's planned research project. Any necessary changes will be incorporated into the POSC on-line form which the student submits after the meeting.

After the Program of Study/Committee form has been routed through the committee, program coordinator and BCB DOGE, and approved by the Graduate College, changes to the POS may be made only with the approval of the POS committee and the Graduate College.

### ***Annual POS Committee Meetings***

All BCB students must meet with their POS committees annually. A written synopsis of research progress should be provided to the committee in advance of the annual POS committee meeting.

**For Ph.D. students, the first POS meeting must be scheduled before the end of the first semester of the second year.** In each subsequent year, BCB recommends that Ph.D. students schedule their annual meeting during October. For annual meetings after the Ph.D. Preliminary Examination, only three committee members are required to be present. All committee members must be present for the Final Defense. Ph.D. students are expected to complete their degree work in approximately five years.

**For M.S. students, the first POS meeting must be scheduled before the end of the first year (usually late Spring or early Summer semester.)** M.S. degree students are expected to complete their degree work in approximately two years. If the M.S. degree is not completed within two years, the POS committee should meet at the end of the second year to review student progress and set a target date for completion of the degree. All committee members must be present for the Final Defense.

Complete copies of the Ph.D. dissertation should be submitted to the POS committee *at least two weeks* before the Final Exam date.

### ***Annual Review of BCB Student Progress***

*Continued participation in the Bioinformatics and Computational Biology program and financial support are contingent upon satisfactory progress towards the degree.* The progress of all students in the BCB program

is evaluated each year by the BCB Chair or members of the BCB Supervisory Committee. This evaluation is based primarily on information gathered through various forms and on-line questionnaires. The Annual Review also offers opportunities for BCB students to provide feedback on the curriculum and program.

Progress will be evaluated on the basis of the following criteria:

- Timely completion of [BCB training requirements](#)
- Satisfactory performance in [laboratory exploration rotations](#) or satisfactory progress in thesis research
- Satisfactory performance in required and recommended [BCB course requirements](#)

### ***Satisfactory Completion of BCB Courses***

The POS committee is responsible for: 1) ensuring that a student's coursework fulfills the BCB requirements, and 2) determining whether required/recommended BCB courses have been satisfactorily completed. In addition, all BCB students must meet the Graduate College Grade Requirements, as described below.

### ***Graduate College Grade Requirements***

A cumulative GPA of at least 3.0 is required by the Graduate College for one-half tuition support by the Graduate College. The grading scale at ISU is as follows: A (4.0), A- (3.67), B+ (3.33), B (3.0), B- (2.67), C+ (2.33), C (2.0), C- (1.67), D+ (1.33), D (1), and F (0). Research grades (699, 697) do not count toward the GPA. See page 22 for BCB Program grade requirements for BCB core courses.

### ***Preliminary Examination (Ph.D. only)***

The Graduate College requires that all Ph.D. students pass a Preliminary Examination before advancing to candidacy for the doctoral degree. Before a BCB student can take the Preliminary Examination, they must have completed at least two of the four BCB core courses. **The Preliminary Examination should be completed before the end of the first semester of the third year.**

See the Graduate College Handbook for all rules governing this exam. Some of the specifics include:

- Submit the on-line Preliminary Oral Exam Request (available [here](#)) at least two weeks before the exam. The form will route through the major professor and BCB Chair.
- All POS committee members must be present at the exam. To have a Committee member "attend" at a distance, a form must be filed with the Graduate College and approved prior to the exam.
- After the request form has been processed by the Graduate College, the Report of Preliminary Oral Examination form will be emailed to department support staff. This is the form which the POS Committee and student will use to report the results of the exam.
- A minimum of six months must elapse between passing the preliminary oral examination and taking the final oral examination.

The examination must contain both a **written** and an **oral** component. The written component **must** include a "formal" Research Proposal in the format of an NSF, NIH or USDA research proposal. Master's degree candidates are not required to take a Preliminary Examination. Research Proposals that serve as the written component of the Preliminary Examination should be submitted *at least two weeks* before the Preliminary Examination.



### ***Writing the Dissertation or Thesis***

***BCB requires students' research projects to be interdisciplinary, including both novel biological and quantitative/computational components.*** In addition, dissertations and theses written for Ph.D. and M.S. degrees in BCB must be in the "alternate format"; that is, they must include one or more papers designed for submission to a professional journal. As a guideline, the Ph.D. thesis is expected to include approximately three published or publishable original manuscripts.

Writing in alternate format provides important practice in writing publishable papers and shortens the time required for the final aspects of a student's thesis research to be published. If a student's POS committee feels that the alternate format is inappropriate for some reason, this requirement can be waived by petition from the POS committee to the BCB Chair.

If research data from other students or researchers is included in the thesis (e.g., the student is one of several co-authors on a manuscript included in the thesis), instructions on how to clearly indicate co-authors' roles in the research and/or preparation of the manuscript is available from the Graduate College. Their [thesis website](#) describes electronic theses/dissertation submission and includes links to most if not all critical information on graduation procedures and forms to graduate.

### ***Application for Graduation***

As noted above, the Graduate College's [thesis website](#) provides links to critical information on graduation procedures and forms including a link to all deadlines for each semester. A link to the on-line Application for Graduation form can be found there as well. Students must submit this online form to the Graduate College indicating the expected semester of graduation. If a student does not graduate at the expected time, the student will need to file a new application for a subsequent semester. A list of all Graduate College forms is available [here](#).

### ***Thesis Seminar and Final Examination***

The Final Examination for the Ph.D. or M.S. degrees is an oral defense of the Ph.D. dissertation or M.S. thesis. This includes a required formal seminar presentation of thesis research to the Bioinformatics and Computational Biology faculty, students, and other members of the Iowa State academic community.

Students should submit an on-line *Request for Final Examination* form after the dissertation or thesis work has been completed and all the other requirements have been met. After receipt of this form, the Graduate College will send a *Report of Final Examination* form directly to the BCB program coordinator who will provide the filled form to the major professor who is responsible for bringing this form to the final oral examination.

Students are strongly encouraged to present the final oral seminar during a regular BCB Seminar series or as part of a seminar series of their home department. *At least two weeks prior* to the seminar, students should provide the BCB office with the text of the formal seminar announcement. Seminar posters will be distributed and an email message will be sent to BCB faculty and graduate students announcing the seminar. Following the public seminar (usually, but not always immediately afterwards), an oral examination (closed to the public) will be given by the POS committee. All members of the POS committee must be present at this meeting. This examination will review the dissertation or thesis and the candidate's knowledge of relevant subjects.

## ***BCB Exit Interview***

The graduating student should schedule a 30-minute exit interview with the BCB Chair. The student can obtain the chair's signature on the *Graduate Student Approval Slip for Graduation* at this meeting. This is one of the last forms needed to graduate. The major professors sign off on this form as well. The BCB Chair is the Director of Graduate Education (DOGE) for the BCB major and he or she must sign this form which should be taken to the Graduate College when complete.

## ***After Graduation***

### **Letters of Recommendation**

When letters of recommendation are needed for future employment or grant proposals, students should directly contact faculty to ask whether they are willing to serve as referees. If so, students should provide the following:

- adequate advance notice (*at least three to four weeks*);
- a copy of the job posting or job description;
- a current Curriculum Vitae; and
- an email reminder one week before the recommendation deadline.

It is courteous (and wise) to send referees a complete numbered list of the letters needed, with deadlines clearly indicated AND pre-addressed labels. An electronic copy of this address list is usually appreciated.

## ***Dismissal***

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.

### **Dismissal Criteria**

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.

- 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.

#### Notice of Resignation

When a student completes their degree or decides to leave Iowa State before completion of their degree, they should fill out a Notice of Resignation form and return this to their supervisor. This form will allow your supervisor to know the last day of work, reason for leaving, any additional comments you wish to make, and your forwarding address. This form can be found [here](#). The student should also let contacts in their department and in their major (bcb@iastate.edu) know as well. Students may download an Employee Separation Checklist found [here](#). This form will provide reminders about items such as the turn-in of keys, paying outstanding bills, returning car tags, and where to have W-2s mailed.

#### 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*.

#### Responsibilities 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*.

*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.

## VI. CAMPUS RESOURCES

### *ISU and BCB Computer Services/Resources*

Iowa State University has outstanding computational and biological research facilities that support collaborative research groups in the life sciences, bioinformatics and computational biology, computer and information sciences, engineering, and complex adaptive systems.

A number of campus and program resources for bioinformatics, computational biology and biological statistics are available on the ISU and BCB websites. Some of these resources include:

### *Technological Resources for the Iowa State community*

[Information Technology \(IT\) Services](http://www.it.iastate.edu/) at Iowa State University -- <http://www.it.iastate.edu/>

IT Services manages a campus-wide network, which augments the various departmental computing facilities. They provide numerous services and resources to the ISU community.

- New students: visit here: <https://www.it.iastate.edu/foryou/students/> to learn how to utilize the available computing resources at Iowa State.
- The Solution Center, customer service for IT Services, is located in 192 Parks Library. Phone them at 294-4000 or email them at [solution@iastate.edu](mailto:solution@iastate.edu).
- [Laptops](#) are available for checkout at the Circulation Desk, 102 Parks Library.
- Video equipment, digital cameras, film cameras and accessories, PA systems, and other equipment are available for checkout in person at the IT Solution Center.
- [High Performance Computing](#): Iowa State University provides faculty, staff and students with high performance computing (HPC) facilities and technology for research purposes. High performance computing utilizes supercomputers and parallel processing for running advanced programs quickly and efficiently.
- So many other services...check them out here: <https://www.it.iastate.edu/services/>.

*ResearchIT* – <http://researchit.las.iastate.edu>

- Collaborate with researchers to solve complex technology problems, freeing them up to focus on their research
- Lots of involvement from other IT people in college, departments, and ITS  
[researchit@iastate.edu](mailto:researchit@iastate.edu)
- Provide access to computational hardware, software, storage, consulting
- Collaborate with LAS, CALS, ENGR, ITS
- [BCB orientation presentation on ResearchIT](#)
- Tutorials
  - Videos: <http://rit.las.iastate.edu/video>
  - How To: <https://researchit.las.iastate.edu/category/how-to>
  - <https://wiki.its.iastate.edu/display/ITHANDBOOK/Handbook>
- Support
  - [Research IT](#)
    - [researchit@iastate.edu](mailto:researchit@iastate.edu)
    - IRC (chat): #bitcom on freenode
  - [ISU IT HPC Team](#)
    - Condo & HPC-Class Support team
    - [hpc-help@iastate.edu](mailto:hpc-help@iastate.edu)

*ISU Library* – Heather Lewin is the BCB Librarian and she has a page devoted to bioinformatics resources. Find that at: <http://instr.iastate.libguides.com/bcb>.

*The BCBGSO* is a student-led initiative in the BCB Program which provides a forum for the exchange of experience, knowledge, and resources to enhance research activities. They have a number of laptops that can be used by members available for checkout [here](#).

*The BCB Library* - BCB has purchased a number of books to benefit BCB students. The library is currently housed in 2014 Molecular Biology Building, the program coordinator's office.

### *Graduate College Resources*

Learn about the many resources provided by the Graduate College at their orientation which will take place on Thursday, August 23 from 5:30 to 7:30 p.m. at the ISU Alumni Center which is located at 420 Beach Avenue.

### *The Graduate College – Professional Development Opportunities*

Visit this site for more information on all of the resources to enhance your professional development.

Developing professional skills is an essential component of a graduate student's career. The Graduate College has identified six essential skills to help graduate students and Postdoctoral Fellows become successful in their respective disciplines. The six core competencies are: Career, Communication, Leadership / Management, Research, Teaching, and Wellness.

Learning to communicate your science is essential. Take advantage of the Graduate College's professional development opportunities to improve your writing and oral communication skills.

### *The Graduate College – University Resources*

ISU, the City of Ames, and the State of Iowa provide students with many opportunities to build a great quality of life while attending graduate school. Numerous resources are listed on this page to help you through all stages of your life as a student at Iowa State. Learning what is available to you on and off campus will ensure your smooth progression through the various stages of your degree program.

### *Graduate and Professional Student Senate (GPSS)*

The [GPSS - Graduate and Professional Student Senate](#) is an elected body through which graduate and professional students express their concern for the welfare of graduate and professional students at Iowa State University, develop and disseminate ideas for the improvement of graduate and professional education, and contribute to the formation of relevant University policies. Founded in 1969, it is the recognized representative body of graduate students at ISU, independent of any other organization on campus.

Each department/program is permitted to elect or choose 1 Senator for every 50 students in the department up to 5 Senators. Typically, senators are elected by the department's students or are selected by the Graduate Student Organization, if one exists. The GPSS office is located in the Student Office Space East, Memorial Union, email: [gpsscio@iastate.edu](mailto:gpsscio@iastate.edu)

## VII. FINANCIAL MATTERS

### *Graduate Appointments and Assistantships*

Most students in Bioinformatics and Computational Biology receive some form of financial support. However, both the source of the support and the responsibilities associated with it vary from situation to situation. New BCB students are admitted to the program in one of two categories discussed in Section III. Students entering Bioinformatics and Computational Biology for exploration rotations usually receive a Research Assistantship (RA) funded by Bioinformatics and Computational Biology during the first year or by an NSF one-year fellowship. Typically, Ph.D. students receive 9 months of guaranteed assistantship support, and M.S. students receive up to 5 months. Stipends for students admitted as transfers, co-majors, or concurrent degree candidates are provided by major professors or home departments and are governed by departmental policies. The responsibilities associated with a stipend depend on the type of assistantship (Research Assistantship or Teaching Assistantship). Information about these forms of support is available in the *Graduate College Handbook*.

***It is important for students to discuss their future graduate assistantship support with potential major professors.*** After a major professor has been chosen, the primary responsibility for a student's assistantship funding lies with the major professor and home department. (For administrative purposes, the major professor's department becomes the student's home department.)

All graduate students on assistantships sign a *Graduate Assistantship Letter of Intent* that lists the terms and conditions of their appointment. Generally, graduate assistantship appointments are on a "one-half time" basis. "Half-time" is the maximum time appointment for graduate students; the remaining "half-time" is spent as a student in graduate studies and research. Appointments can be terminated by mutual consent or for reasons as described in the *Graduate College Handbook*. Any questions regarding graduate appointments should be directed to the BCB office (2014 Molecular Biology Building).

- Financial constraints and program changes may result in adjustment in specific responsibilities and/or sources of funds during the period of appointment.
- The *Graduate Assistantship Letter of Intent* is based on the University fiscal year and does not imply that support will terminate on the end date noted in the *Letter of Intent*.
- BCB students will receive continued Graduate Assistantship support (either as a Research Assistant or Teaching Assistant) for the duration of Ph.D. degree work, as long as students remain in good standing. The specific source(s) of funding may vary depending on resources available to the major professor.
- If a student transfers from the BCB Ph.D. program to the BCB M.S. program, the student will be financially responsible for his/her education after the transfer.

The University payday is the last workday of each month, with pay deposited directly into students' bank accounts. Direct deposit and any bank account changes can be done on a student's AccessPlus account. Deductions are made for Federal and State income taxes and Social Security, if applicable.

### ***Competitive Fellowships for Enrolled Students***

In addition to the fellowships available for new students entering the BCB program, fellowship opportunities also have been provided for current BCB students. In the past, these opportunities included the following:

#### *Pioneer Hi-Bred International/Baker Center Graduate Research Fellowships*

The Pioneer Fellowships provide a stipend of \$20,000 per year for two years, plus tuition, benefits and fees. Pioneer Fellows work as interns at Pioneer Hi-Bred for eight weeks during the summer of their first year of support. Subsequent internships can be arranged by agreement of both parties.

Ph.D. students who have completed at least their first year of graduate training are eligible to apply. Eligibility is not limited to students in the Bioinformatics and Computational Biology graduate program, those receiving IGERT or MGET support, or those with major professors affiliated with the Baker Center. Students in any program or department with a research interest in computational molecular biology and bioinformatics are eligible.

Pioneer Fellowships are awarded to deserving students with strong records of research accomplishment or evidence of great potential. The awards are made in the Fall and begin on Jan. 1.

#### *James Cornette Research Fellowships in Bioinformatics and Computational Biology*

When funding is available, Cornette Fellowships provide \$10,000 six-month research assistantships plus tuition, benefits, and fees.

Ph.D. students majoring in Bioinformatics and Computational Biology who have completed at least their first year of graduate training are eligible to apply. Each student is eligible for a maximum of two Cornette Research Fellowships during his or her graduate program. Students must have met their program timeline requirements for academic, course, and training requirements and other required activities. (These requirements will vary for students depending on their program and their year of graduate study.)

The Cornette Fellowships are awarded to deserving students with strong records of research accomplishment or evidence of great potential. The awards are made in the Fall and begin on Jan. 1.

### ***Grants for Professional Travel***

Attendance and presentation of research results at professional meetings are an essential part of the BCB graduate training program. Students should attend at least one national or international meeting during their degree program. Financial assistance is available through *Professional Advancement Grants* (PAG) from the Graduate College and the Graduate and Professional Student Senate (GPSS), from major professors and home departments, and from the BCB program.

Students interested in attending a conference should:

- discuss conference opportunities with their major professor and ask about the availability of funding provided through the major professor and the home department;
- plan conference attendance well in advance to ensure the best pricing for registration and airfares, and to secure funding;
- complete the [Professional Advancement Grant \(PAG\) application](#) for funding from the Graduate College and the Graduate and Professional Student Senate.



Provide information on the conference and the funding you have requested to the BCB Office. Funding may be available from the BCB program. The following schedule has been used in the past: up to a maximum of \$1,000 over a 5 year period for a Ph.D. student or \$400 over a two-year period for an M.S. student:

- \$200 per year, when presenting research
- \$100 per year, when not presenting research

## ***Benefits***

### *Student Health Insurance*

Single student coverage under the Iowa State University Student Health Insurance Plan is provided free of charge to all graduate assistants at ISU. Insurance sign-up for new students takes place during Orientation. Information on eligibility and costs can be found [here](#).

And, more information and help can be found here:

For questions about your health insurance:

- Wellmark, 1331 Grand Avenue, Des Moines, IA 50309, 1-800-694-4110; website: <http://www.wellmark.com>

For health-related questions: BeWell 24/7: (844) 84-BEWELL

- To make an appointment to see a health care doctor:  
Thielen Student Health Center - (515) 294-5801

For questions about your dental insurance:

- Delta Dental of Iowa, P.O. Box 9000, Johnston, IA 50131-9000; 1-800-544-0718  
<https://www.deltadentalia.com/>

For questions about eligibility, policy cancellations, waiver of coverage, verification letters:

- ISU University Human Resources, Benefits Office - SSHIP  
3810 Beardshear Hall, (515) 294-4800 or (877) 477-7485; Email: [isusship@iastate.edu](mailto:isusship@iastate.edu)

### *Dental Plan*

- Graduate assistants with an appointment of one quarter time or more for at least three (3) months of the fall or spring terms are eligible for the dental insurance plan, which is partially subsidized by the university. The monthly premium is \$19.75, ISU pays \$12.50 and the graduate students pays a \$7.25 monthly amount.

All international students, whether on assistantship or not, are required to carry the ISU Student Health Insurance or to be covered by another health insurance policy. For more information, contact the International Student and Scholars office, 3241 Memorial Union, 294-1120, [isso@iastate.edu](mailto:isso@iastate.edu).

### *Health Service*

All students have access to services provided by the ISU Thielen Student Health Center. A mandatory health fee per semester and a health facility fee are assessed to all students registered for five or more credits. This health fee pays for some services offered at the Student Health Center. The health facility fee applies to the cost of the new Student Health Center. The health center fee is optional for students enrolled for fewer than five credits. The health fee can be increased without notice.

Additional information about the student group plan medical insurance and the benefits of the mandatory health fee can be obtained from the Thielen Student Health Center (294-5801). Information about the Student Health Service also is available in the ISU General Catalog and on the web at <http://www.health.iastate.edu/>.

### Leave

During the exploration rotation period, BCB research assistants with half-time appointments earn vacation at a rate of eight hours per month (equivalent to two calendar days per month). A student may take vacation with the approval of the temporary advisor and by notifying the BCB office.

After students' *Home Department* forms are approved, leaves (including maternity/paternity) are handled by the major professors and home departments, which develop and implement their own policies. Vacation time accumulated prior to joining home departments is not carried forward.

The *Graduate College Handbook* states only:

*Arrangements for a leave of absence are made between the graduate assistant and that assistant's supervisor. When a graduate student employee needs to be absent either for personal reasons or illness, the supervisor should be understanding and accommodating to that need. At the same time, the graduate assistant should attempt to plan personal leave so that it does not interfere with or cause neglect of the duties associated with his or her appointment. Supervisors of graduate assistants are responsible for ensuring that their assistants do not exceed reasonable limits for leave.*

All ISU students with assistantship appointments are employees of ISU and, as such, are allowed the regular university holidays (New Year's Day, Martin Luther King Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, the Friday after Thanksgiving Day, and Christmas Day, plus one additional day each year determined by the university administration). Absences for other time off must be arranged with the temporary or major professor as outlined above.

### Injuries and Injury Reports

If a student is injured while performing duties as a Graduate Assistant, he or she must submit a *First Report of Injury* as soon as possible. This form is available from the University Human Resources' Workers' Compensation unit [here](#). Usually the University's Worker's Compensation insurance carrier will pay for medical care.

## VIII. ADMINISTRATIVE MATTERS

### *Administrative Assistance*

The main administrative office for Bioinformatics and Computational Biology graduate students is the BCB program office in 2014 MBB. Office hours are variable. Please call or email for an appointment. The BCB Program Coordinator can be contacted at 294-5122 or [bcb@iastate.edu](mailto:bcb@iastate.edu).

### *Communications*

It is vital that students maintain good contact with Bioinformatics and Computational Biology personnel throughout their graduate program. There are a number of ways to do this:

#### Student Contact Information

The BCB program maintains a record of each student's current email address, local home address and telephone number, as well as campus address and telephone number. It is important that students advise the BCB program office of any address changes.

#### Email

Students should check email at least daily, as this is the **primary means** of keeping students informed about BCB program activities.

#### Internet

The Bioinformatics and Computational Biology website contains most of the information pertaining to ongoing program events, and is updated regularly. Students should visit the website regularly at [www.bcb.iastate.edu](http://www.bcb.iastate.edu).

#### Campus Mail Service

All first-year Bioinformatics and Computational Biology graduate students can use the program office, 2014 Molecular Biology Building as their temporary address in the Molecular Biology Building during the exploration rotation period. After the student chooses a major professor, the student's home department will arrange a permanent campus address and mailbox.

#### Telephone

Local calls can be made on most campus phones. Long distance calls can be made on University phones only with the prior approval of the person to whom the phone is assigned.

### *Transportation*

#### Bicycles

As with motor vehicle parking, the parking of bicycles must also be controlled to keep the campus safe and convenient for everyone. These regulations are intended to prevent bicycles from parking in areas of high pedestrian traffic, areas that could cause a safety hazard, or could be disruptive to other people.

1. No person is allowed to ride, park, or propel a bicycle on any university property without a bicycle identification sticker issued by Iowa State University
2. Bicycles must be parked in the bicycle racks provided. They must not be parked on lawns or sidewalks; chained to trees, light poles, fences, benches, etc. Bicycles that are improperly parked may be impounded by cutting and removing a locking device when necessary. Of

particular concern are bicycles parked on disability access ramps. Bicycles found on these ramps will be immediately removed and impounded.

3. Bicycles that are considered abandoned will be impounded. They may be removed by cutting the locking device, when necessary.
4. Bicycles must not be taken inside any university building except those authorized by the Department of Public Safety.

### [Bicycle Registration Form](#)

#### *Locating Your Bike's Serial Number*

The majority of serial numbers are located under the bottom bracket where the two pedal cranks meet. Simply turn your bike upside down and record the number. If there is no serial number there then check places like the headset at the front of the bike or the rear stays. Other locations of the serial number are:

1. Headset
2. Rear stays
3. Seat downtube next to crank
4. Top of crank

The best chance at recovering a stolen bicycle is having a registered serial number. These numbers are used by police within the City of Ames. You need the manufacturer's serial number to register your bicycle.

#### *Bicycle Impound Policy*

ISU Parking Division will tag bikes that appear abandoned. After two weeks any bikes that still have the tag attached will be subject to impoundment for 90 days. If the bike is not claimed within the 90 days it will go to Asset Recovery and be sold.

[http://www.cip2c.com/ReportIncident/IncidentEntry\\_Disclaimer.aspx](http://www.cip2c.com/ReportIncident/IncidentEntry_Disclaimer.aspx);

Please use the above link if you need to report a stolen bike.

#### *Buses*

CyRide is the Ames bus system. Students can ride all CyRide routes free of charge upon presentation of a current *ISU* card. During the school year the buses leave from most locations every 20 minutes. Schedules are widely available throughout campus. Further CyRide information can be found [here](#).

#### *Cars and Parking*

The Department of Public Safety (<http://www.dps.iastate.edu/>) has a Parking Division located in 27 Armory. Parking is scarce on campus and students can consult with them about these options:

#### *Commuters*

Those who drive to campus on a daily basis have a few options:

Commuters can register their cars and apply for a permit.

- Lot 29 (this lot is north of Molecular Biology)
- Lot 68 (this lot is located off University Blvd near Haber Road); this lot would be closer for commuters with classes on the east and south side of campus.
- Lot 119 (this lot is located at Wanda Daley Drive and Stange Road—a walking tunnel under the railroad tracks brings you out near Printing and Publications)

### *The Commuter Lot at Iowa State Center*

Commuters can park at the designated (A3, A4, B4, B5, B6) parking lots at the Iowa State Center for free and take [Cy-Ride's](#) Orange Route into campus. Overnight parking is not available in the commuter lots. Ann Campbell Transit Station, Iowa State Center.

### *Paying on Campus*

Commuters have the option of paying to park each time they come to campus. Pay-by-the-hour machines are available in lot 100 (Lied Rec Center), East Campus Parking Deck on the east side of campus and lot 21 on the west end of campus. There are also meters in some of the lots, but carefully read the signs and meters as some have time limits that do not accommodate classes.

### *Professional Ethics*

Bioethics training is a critical component of the BCB graduate program requirements. Every BCB student should carefully read [On Being a Scientist – Responsible Conduct in Research](#).

It is imperative that every student understand the ethical standards of science and conduct his or her scholarly activities accordingly. Scientists who commit unethical acts, whether from carelessness, ignorance, or malice, quickly lose the respect of the scientific community and may be prevented from receiving funding support. Scientific misconduct includes such activities as:

- falsification of data, ranging from fabrication to deceptively selective reporting, including the purposeful omission of conflicting data with the intent to falsify results
- plagiarism...representation of another's work as one's own
- misappropriation of the ideas of others...unauthorized use of privileged information
- misappropriation of funds or resources for personal gain
- falsification of one's credentials

At ISU, these acts are taken very seriously and constitute "academic misconduct" (ISU Faculty Handbook). Individuals found guilty of academic misconduct may suffer a variety of penalties, up to and including expulsion from the university.

If a student is aware of a potentially unethical situation, he or she should seek the advice of a trusted professor. Students may also contact the BCB Chair or a member of the BCB Supervisory Committee. All discussions with the Chair and the Supervisory Committee members will be confidential. Alternatively, students may go directly to Associate Vice Provost for Research, who is responsible for investigating charges of academic misconduct on campus. It is very important to protect the rights of the individual whose actions are questioned. Frivolous accusations of misconduct and vicious spreading of rumors are just as unethical as fabrication of data or plagiarism.

### *Nondiscrimination and Affirmative Action Statement*

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. veteran. Inquiries regarding non-discrimination policies may be directed to the Director of the Office of Equal Opportunity, Title IX /ADA Coordinator, and **Affirmative** Action Officer, 3350 Beardshear Hall, Ames, Iowa 50011, Tel. 515 294-7612, email [eoffice@iastate.edu](mailto:eoffice@iastate.edu). Additional information can be found on the Office of Equal Opportunity's website at: <http://www.eoc.iastate.edu/>.

## FORMS APPENDIX

Most [Iowa State](#) and BCB forms are available on-line. Visit the [Forms and Publications page](#) on the BCB website for links to many forms you will need to file throughout your graduate career. Enjoy your adventure !