Program Mission

BCB Mission Statement

Program Mission Statement:

Bioinformatics and Computational Biology (BCB) is a highly flexible interdisciplinary graduate program that prepares students to conduct research in academics, health sciences, agriculture, biodiversity, and other industries. The BCB program integrates research and coursework in computer sciences, biological sciences, and mathematical sciences.

Program Goal (add a minimum of 3 program goal "plan items")

Goal 1) Graduate Training

Goal Statement:

Provide an interdisciplinary graduate training program in bioinformatics and computational biology, building skills for harnessing the data revolution to address questions in genomics, biodiversity, medicine, and more.

Alignment to UI Strategic Plan Goals: Transform (Goal 3): Increase our educational impact.

Indicators/Metrics to Evaluate Progress:

1) Current number of enrolled MS and PhD students

2) Completed MS and PhD degrees during the reporting period

3) Committee evaluations of mastery of depth areas at final defense

List of Actions the Program Will Take to Achieve Goals :

1) Maintain interdisciplinary faculty and curriculum for training in BCB.

2) Offer targeted training opportunities (e.g. workshops) to develop specific, cutting-edge skills.

Goal Achievement Level: Met

Goal 2) Interdisciplinary Research

Goal Statement:

Promote interdisciplinary research in bioinformatics and computational biology involving BCB graduate students, faculty and others at University of Idaho.

Alignment to UI Strategic Plan Goals:

 Innovate (Goal 1): Scholarly and creative products of the highest quality and scope, resulting in significant positive impact for the region and the world.

Indicators/Metrics to Evaluate Progress:

1) Grants, publications, presentations, and other scholarly research output from BCB faculty and students.

List of Actions the Program Will Take to Achieve Goals :

1) Provide support for BCB students to publish and present their work.

2) Facilitate grant proposals that will support research involving BCB students and faculty.

Goal Achievement Level: Met

Goal 3) Train Future Scientists

Goal Statement:

Train scientists for careers in bioinformatics and computational biology, to meet societal needs in this growing interdisciplinary field in academia, agriculture, government research, industry, and other sectors.

Alignment to UI Strategic Plan Goals:

 Engage (Goal 2): Suggest and influence change that addresses societal needs and global issues, and advances economic development and culture.

Indicators/Metrics to Evaluate Progress:

1) Next career steps for graduating BCB students.

List of Actions the Program Will Take to Achieve Goals :

1) Facilitate rotation/internship opportunities to allow students to make professional connections and gain experience during the BCB degree program.

Goal Achievement Level: Met

Student Learning Assessment Report (add one "plan item" for each major, degree, and/or certificate offered by dept)

Bioinformatics & Computational Biology PhD

Assessment Report Contact: Paul Hohenlohe

Program Changes in Past Year:

No changes to the BCB PhD curriculum or organization.

Learning Outcomes are Communicated to All Students in Program (check box if true): true

Learning Outcomes are Communicated to All Faculty (check box if true): true

Optional: Framework Alignment:

Import Outcomes Data (from Anthology Outcomes):

1.

Fundamental Skills

Obtain understanding of the disciplines of Bioinformatics and Computational Biology (BCB): the biological sciences, computational sciences, and mathematical sciences. Master the fundamental concepts of BCB from the perspective of each of the three program disciplines with the ability to integrate the multidisciplinary principles.

Academic Year 2020-2021: Bioinformatics & Comptnl Biol (Ph.D.)

Term: Overview

Exceeded	100%	13
Met	0%	0
Partially Met	0%	0
Not Met	0%	0

2.

Specialization

Acquire specialized expertise and master state-of-the-art research topics in one of the three BCB areas: the biological sciences, computational sciences and mathematical sciences.

Academic Year 2020-2021: Bioinformatics & Comptnl Biol (Ph.D.)

Term: Overview

Exceeded	100%	5
Met	0%	0
Partially Met	0%	0
Not Met	0%	0

3.

Communication Skills

Be able to explain BCB concepts and research results to people with widely varying backgrounds: experts in the same and other fields as well as the general public.

Academic Year 2020-2021: Bioinformatics & Comptnl Biol (Ph.D.)

Term: Overview

Exceeded	100%	11
Met	0%	0
Partially Met	0%	0
Not Met	0%	0

4.

Interdisciplinary Skills

Accomplish significant and innovative interdisciplinary research by combining concepts and theories from the three BCB areas.

Academic Year 2020-2021: **Bioinformatics & Comptnl Biol (Ph.D.)**

Term: **Overview**

Exceeded		**93.33%**	**14**
Met		**6.67%**	**1**
Partially Met		**0%**	**0**
Not Met		**0%**	**0**

5.

Research Skills

Successfully propose significant and innovative interdisciplinary research by combining concepts and theories from the three BCB areas.

Academic Year 2020-2021: **Bioinformatics & Comptnl Biol (Ph.D.)**

Term: **Overview**

Exceeded		**100%**	**9**
Met		**0%**	**0**
Partially Met		**0%**	**0**
Not Met		**0%**	**0**

Summary of Student Learning:

The assessment of student learning for the BCB PhD program indicates success at achieving program goals. All learning outcome goals were met or exceeded, based on evaluations of the 5 students who completed the BCB PhD degree during this period. Learning outcomes are evaluated by each student's faculty supervisory committee, with scores averaged across committee members. These averages, and nearly all the individual scores on all metrics, were at the level of "satisfactory" or above, according to the rubric for committee evaluations. No specific areas of weakness were suggested by the pattern of individual scores.

Summary of Faculty Discussion:

Assessment of the BCB PhD program was presented at a faculty meeting on 9/16/2021. Discussion focused on clarifying requirements in the BCB curriculum to maintain the interdisciplinary training aspect of the program, and recruitment of students to the program.

Attached Files

📄 BCB Faculty Meeting Agenda 9-16-21_FINAL.pdf

Summary of Changes/Improvements Being Considered:

The evaluation and scoring process used by the BCB PhD program ties closely to the specific learning outcomes, and committee member scores provide a useful quantitative measure of faculty evaluations of student learning. To maintain comparability and allow us to identify trends in student learning outcomes across years, the BCB programs plans to continue using committee scores in assessment.

Inter-rater Reliability:

Because of the interdisciplinary nature of the BCB program and the variation inherent among students in a PhD degree program, the metrics for learning outcomes are necessarily subjective. Ratings from student committee members use a 5-point scale: 1 = poor performance, 2 = area of weakness, 3 = satisfactory level for their degree, 4 = area of strength, 5 = excellent performance. Scores are averaged across all 4-6 committee members for each student to remove inter-rater variation.

Closing the Loop:

The assessment indicates that the BCB PhD degree program continues to meet or exceed all learning outcome goals. Discussions are ongoing to improve opportunities and provide sources of support for student training, particularly in communication and research skills, and this includes establishing a funding mechanism to support BCB student travel to present their work at scientific conferences and to support publication costs. Because of the rapidly changing nature of the field of bioinformatics, BCB faculty also continually contribute to keeping the curriculum up to date and providing learning opportunities that match current practice in the field. An example of this is the use of workshops or short courses, which BCB students may take for credit, that focus on specific skills or topics that are in current demand in bioinformatics.

Bioinformatics & Computational Biology MS

Assessment Report Contact: Paul Hohenlohe

Program Changes in Past Year:

No changes to the BCB MS curriculum or organization.

Learning Outcomes are Communicated to All Students in Program (check box if true): true

Learning Outcomes are Communicated to All Faculty (check box if true): true

Optional: Framework Alignment:

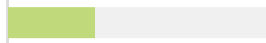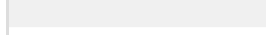**Import Outcomes Data (from Anthology Outcomes):**

1.

Knowledge Skills

Obtain understanding of the disciplines of Bioinformatics and Computational Biology (BCB): the biological sciences, computational sciences, and mathematical sciences. Master the fundamental concepts of BCB from the perspective of each of the three program disciplines with the ability to integrate the multidisciplinary principles.

Academic Year 2020-2021: **Bioinformatics & Comptnl Biol (M.S.)**

Term: **Overview**

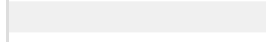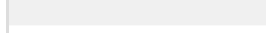|			
Exceeded		**66.67%**	**4**
Met		**33.33%**	**2**
Partially Met		**0%**	**0**
Not Met		**0%**	**0**

2.

Specialization

Acquire specialized expertise and master state-of-the-art research topics in one of the three BCB areas: the biological sciences, computational sciences and mathematical sciences.

Academic Year 2020-2021: **Bioinformatics & Comptnl Biol (M.S.)**

Term: **Overview**

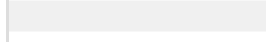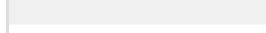|			
Exceeded		**100%**	**3**
Met		**0%**	**0**
Partially Met		**0%**	**0**
Not Met		**0%**	**0**

3.

Communication Skills

Be able to explain BCB concepts and research results to people with widely varying backgrounds: experts in the same and other fields as well as the general public.

Academic Year 2020-2021: **Bioinformatics & Comptnl Biol (M.S.)**

Term: **Overview**

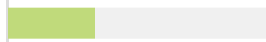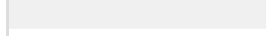|			
Exceeded		**66.67%**	**4**
Met		**33.33%**	**2**
Partially Met		**0%**	**0**
Not Met		**0%**	**0**

4.

Research Skills

Accomplish significant and innovative interdisciplinary research by combining concepts and theories from the three BCB areas.

Academic Year 2020-2021: **Bioinformatics & Comptnl Biol (M.S.)**

Term: **Overview**

Exceeded		**66.67%**	**6**
Met		**33.33%**	**3**
Partially Met		**0%**	**0**
Not Met		**0%**	**0**

Summary of Student Learning:

The assessment of student learning for the BCB MS program indicates success at achieving program goals. All learning outcome goals were met or exceeded, based on evaluations of the 3 students who completed the BCB MS degree during this period. Learning outcomes are evaluated by each student's faculty supervisory committee, with scores averaged across committee members. These averages, and nearly all the individual scores on all metrics, were at the level of "satisfactory" or above, according to the rubric for committee evaluations. A potential area of weakness is in the progress of student toward publications, which is reflected in the Research Skills learning outcome.

Summary of Faculty Discussion:

Assessment of the BCB program was presented at a faculty meeting on 9/16/2021. Discussion focused on clarifying requirements in the BCB curriculum to maintain the interdisciplinary training aspect of the program, and recruitment of students to the program.

Attached Files

📄 BCB Faculty Meeting Agenda 9-16-21_FINAL.pdf

Summary of Changes/Improvements Being Considered:

The evaluation and scoring process used by the BCB MS program ties closely to the specific learning outcomes, and committee member scores provide a useful quantitative measure of faculty evaluations of student learning. To maintain comparability and allow us to identify trends in student learning outcomes across years, the BCB programs plans to continue using committee scores in assessment.

Inter-rater Reliability:

Because of the interdisciplinary nature of the BCB program and the variation inherent among students in a research MS degree program, the metrics for learning outcomes are necessarily subjective. Ratings from student committee members use a 5-point scale: 1 = poor performance, 2 = area of weakness, 3 = satisfactory level for their degree, 4 = area of strength, 5 = excellent performance. Scores are averaged across all 3-4 committee members for each student to remove inter-rater variation.

Closing the Loop:

The assessment indicates that the BCB MS degree program continues to meet or exceed all learning outcome goals. Discussions are ongoing to improve opportunities and provide sources of support for student training, particularly in communication and research skills. Partially in response to the concern about student progress toward publications, and to support student's research training, the BCB governing board has established a funding mechanism to support BCB student travel to present their work at scientific conferences and to support publication costs. Because of the rapidly changing nature of the field of bioinformatics, BCB faculty also continually contribute to keeping the curriculum up to date and providing learning opportunities that match current practice in the field. An example of this is the use of workshops or short courses, which BCB students may take for credit, that focus on specific skills or topics that are in current demand in bioinformatics.

Bioinformatics & Computational Biology Graduate Certificate

Assessment Report Contact: Paul Hohenlohe

Program Changes in Past Year:

No changes to the BCB curriculum or organization.

Learning Outcomes are Communicated to All Students in Program (check box if true): true

Learning Outcomes are Communicated to All Faculty (check box if true): true

Optional: Framework Alignment:

Import Outcomes Data (from Anthology Outcomes):

No students were enrolled or completed the BCB graduate certificate during the assessment period.

> 1

Fundamental Skills

Students will demonstrate an augmented understanding in bioinformatics, mathematics and computational sciences.

Academic Year 2020-2021: Bioinformatics & Comptnl Biol (GR Cert)

Term: Overview

No Results

> 2

Research Skills

Students will have the capability to participate in interdisciplinary research and industry projects and be able to explain BCB concepts (from the biological, mathematical, and computational sciences) to people with widely varying backgrounds, from professionals in other fields to lay people.

Academic Year 2020-2021: Bioinformatics & Comptnl Biol (GR Cert)

Term: Overview

No Results

> 3.

BCB Language

Students will use and understand a common 'language' that allows those with a background in one of the BCB disciplines to communicate and collaborate in interdisciplinary projects with colleagues from other disciplines.

Academic Year 2020-2021: Bioinformatics & Comptnl Biol (GR Cert)

Term: Overview

No Results

Summary of Student Learning:

n/a

Summary of Faculty Discussion:

Assessment of the overall BCB program was presented at a faculty meeting on 9/16/2021, although discussion did not include the BCB graduate certificate specifically.

Summary of Changes/Improvements Being Considered:

No changes are currently being considered to the assessment process.

Inter-rater Reliability:

Assessment scores are averaged across coursework and multiple faculty in the BCB graduate certificate, in order to reduce inter-rater variation.

Closing the Loop:

No students completed the BCB graduate certificate during the assessment period. However, the curriculum of the certificate closely follows the core curriculum of both the MS and PhD degrees. Assessment of those degree programs indicates that the coursework continues to meet or exceed learning outcomes. Work is ongoing in the BCB program to keep the curriculum current with the rapidly changing field of bioinformatics, based on assessment of the MS and PhD programs, and these changes will carry over to the BCB graduate certificate program as well.

Student Achievement

Bioinformatics & Computational Biology

Student Retention:

The BCB director and administrative staff individually track student progress through the MS and PhD degree programs. During this assessment period, a total of 16 students were enrolled in the BCB PhD program and 5 students in the BCB MS program. During this period, 5 PhD students and 3 MS students completed their degrees. One student withdrew from the BCB PhD program as his major professor left the University of Idaho. All other students remain enrolled in BCB and progressing toward degree completion.

Student Persistence:

With the exception of 1 PhD student who withdrew from the program, all BCB PhD and MS students who were enrolled during the assessment period have either finished their degree or remained in the BCB program.

Student Completion:

Students in the BCB program complete their degrees at a high rate, and requiring a period of time equivalent to comparable degree programs across the country. Of the 5 students who finished the BCB PhD degree during this period, one took 4.5 years, one took 6 years, and the remaining three took 5 years. Of the 3 students who completed the BCB MS degree, one took 2.5 years, one took 3.5 years, and one took 4.5 years.

Student Postgraduate Success:

The BCB program individually monitors student career outcomes following degree completion. PhD graduates from this assessment period are currently employed in postdoctoral research positions (academic and government), and in the biotechnology industry.

Identify Equity Gaps:

Data are not available to analyze equity gaps.

Effective Learning Environment and Closing Equity Gaps:

As a graduate program, BCB strives for personal, individual interaction and a supportive and collegial environment for students. BCB faculty are engaged as major professors and committee members, and also in contributing to a BCB curriculum that maintains the interdisciplinary strength of BCB.

BCB leadership are currently working with students to produce a diversity statement, outlining the principles of equity and inclusion in the BCB program and specific ways in which BCB will continue to address equity gaps.

Demand and Productivity

Bioinformatics & Computational Biology

External Demand:

Degrees in bioinformatics and computational biology are in demand, and students enroll with career goals in academia, biotechnology industry, agriculture, and other fields. Because the BCB PhD and MS degrees are research degrees, the primary limitation to enrollment is finding funding support for students. Students are typically supported by either teaching assistantships in their major professor's home department or research assistantship positions funded by external grants or fellowships. Each year, more students apply to the BCB program than can be accepted based on available funding support.

Internal Demand:

Because BCB is an interdisciplinary degree program, the majority of courses taken by students in the BCB program (aside from research and seminar credits) are offered by other academic departments. This includes the 3 BCB core courses (common to MS, PhD, and certificate), which serve both graduate students in both BCB and non-BCB degree programs at the university.

Credit Productivity:

Data on credit hour production are not available for BCB.

Financial Health and Resources

Bioinformatics & Computational Biology

Financial Health:

BCB is an interdisciplinary graduate degree program, with a very small budget. All BCB faculty remain associated with their home departments, BCB students on teaching or research funding are supported through an academic department or research institute, and most of the required coursework is offered through other departments.

Institutional support for the BCB program includes part-time administrative staff and the BCB Director, and support from the Institute for Interdisciplinary Data Sciences (IIDS), which includes funding of a limited number of BCB student fellowships. BCB has a small amount of funds that are used to support BCB students to travel to present their research, cover publication costs, or for other student training opportunities.

This financial model is sustainable, and BCB can continue to foster interdisciplinary research and contribute to the graduate training opportunities at UI.

Efficient Use of Resources:

As described above, BCB has a limited budget beyond administrative personnel time. For student support, the Director and BCB governing board evaluate requests for funding from students as they are received to determine whether they further a student's training.