

## Program-Level Assessment: Annual Report

Program: Bioinformatics & Computational Biology

Department: CS/Math&Stats/Biology/Chemistry

Degree or Certificate Level: M.S.

College/School: Arts & Sciences

Date (Month/Year): 11/23/20

Primary Assessment Contact: Maureen Donlin

In what year was the data upon which this report is based collected? 2019-2020

In what year was the program's assessment plan most recently reviewed/updated? 2018

### 1. Student Learning Outcomes

Which of the program's student learning outcomes were assessed in this annual assessment cycle?

We focused on assessing the following SLOs this year

- 1) Work as part of multidisciplinary teams in corporate or academic environments
- 2) Effectively communicate research approaches and findings.

### 2. Assessment Methods: Artifacts of Student Learning

Which artifacts of student learning were used to determine if students achieved the outcome(s)? Please identify the course(s) in which these artifacts were collected. Clarify if any such courses were offered a) online, b) at the Madrid campus, or c) at any other off-campus location.

We continued to collect reflections from the student internship experiences. We also tracked published research manuscripts, poster and oral presentations made by the students at research meetings. We evaluated and provided feedback on oral presentations during the required colloquium.

### 3. Assessment Methods: Evaluation Process

What process was used to evaluate the artifacts of student learning, and by whom? Please identify the tools(s) (e.g., a rubric) used in the process and include them in/with this report.

SLO 1 is evaluated based on their research mentors survey as well as reports from the internship advisors. We have attached the reflection and internship advisor surveys. We maintain contact with our alumni and periodically survey them for their reflections on how the degree training has helped them develop the skills necessary to work as part of a multi-disciplinary team and what course work might have helped them transition to their current position more easily.

SLO 2 is evaluated as part of the colloquium in which the students make an oral presentation during their second year. Several students have made presentations at the SLU GSA symposium or have attended professional meetings in which they have made presentations.

Overall, we interview students as they prepare to graduate to get their feedback on the course work and other aspects of the program.

### 4. Data/Results

What were the results of the assessment of the learning outcome(s)? Please be specific. Does achievement differ by teaching modality (e.g., online vs. face-to-face) or on-ground location (e.g., STL campus, Madrid campus, other off-campus site)?

Our assessment of SLO 1 was based primarily on answers to the internship reflections. From these we realized that many students were exposed to or were doing a newer type of analysis known as scRNA sequencing. We also realized that several students were working in an area where image analysis was a key part of the research.

Many students confirmed the necessity of R programming and the usefulness of Unix tools. W

A few students have struggled to find internships, although ultimately all were successful. In some cases, students waited too long to start looking for internships.

## 5. Findings: Interpretations & Conclusions

What have you learned from these results? What does the data tell you?

Although we cannot offer direct experience with every new type of bioinformatics analysis, we have tried and will continue to bring in colloquium speakers who are conducting research using the bioinformatics techniques that the students are likely to see during their internships.

We need to expand the choices for elective course work, including offerings in image analysis. We will work to manage the schedules such that first year students do not have conflicts between Biometry (R programming) and other courses they are likely to take that semester.

Since a successful internship is a key part of our program, we wanted to help students navigate the process of finding more easily.

## 6. Closing the Loop: Dissemination and Use of Current Assessment Findings

A. When and how did your program faculty share and discuss these results and findings from this cycle of assessment?

We shared these data with the primary faculty and discussed ways to improve the search for internships. We came up with the plan to include outside speakers, who have or are willing to host interns, make a presentation on their research during orientation. This introduces students to the different types of bioinformatics research conducted at SLU and in other area universities and local companies.

B. How specifically have you decided to use these findings to improve teaching and learning in your program? For example, perhaps you've initiated one or more of the following:

Changes to the Curriculum or Pedagogies

- Course content
- Teaching techniques
- Improvements in technology
- Prerequisites
- Course sequence
- New courses
- Deletion of courses
- Changes in frequency or scheduling of course offerings

Changes to the Assessment Plan

- Student learning outcomes
- Artifacts of student learning
- Evaluation process
- Evaluation tools (e.g., rubrics)
- Data collection methods
- Frequency of data collection

Please describe the actions you are taking as a result of these findings.

We are changing the CSCI course in high performance computing to reflect the increased interest and use of cloud computing. This course will now be a sequence of two courses, one in parallel computing and the second in distributed computing.

We have expanded the courses in our list of electives to include new offerings in the CS, Math/Stats, Biology and Chemistry departments. The new course electives include:

BIOL 5520	Biochemical Pharmacology
CSCI 5610	Concurrent and Parallel Programming
CSCI 5620	Distributed programming
CSCI 5030	Principles of Software Design
CSCI 5360	Web Technologies
CSCI 5730	Evolutionary Computing
CSCI 5740	Introduction to Artificial Intelligence
CSCI 5760	Deep Learning
CSCI 5830	Computer Vision
STAT 5087	Applied Regression
STAT 5088	Bayesian Statistics
MATH 5080	Probability Theory
MATH 5021	Intro to Analysis
MATH 5023	Multivariable Analysis
CHEM 5470	Principles of Medicinal Chemistry

If no changes are being made, please explain why.

## 7. Closing the Loop: Review of Previous Assessment Findings and Changes

### A. What is at least one change your program has implemented in recent years as a result of assessment data?

We have set aside an afternoon during our new student orientation for presentations by researchers both within and outside SLU who have hosted or are willing to host BCB interns. This introduces the students to the different areas of bioinformatics and helps them identify potential internships.

We have created a shared google drive called "BCB\_student\_resources" where we post internship and job opportunities. We also post these opportunities on a shared Slack channel.

### B. How has this change/have these changes been assessed?

We have assessed this by surveying the students and asking if they found this to be useful.  
Tracking enrollment by BCB students in new elective courses.

### C. What were the findings of the assessment?

Greater than 80% of the students liked the afternoon of presentations, although some found it to be a bit overwhelming.  
We are seeing BCB students enrolling in the new electives.

### D. How do you plan to (continue to) use this information moving forward?

We will continue to include outside presenters during our new student orientation but are encouraging presenters to keep presentations less than 15 minutes and to reduce the amount of detail included.

**IMPORTANT: Please submit any assessment tools and/or revised/updated assessment plans along with this report.**