

**Agenda and Evaluation Report for
Audit & Review Face-to-Face Meeting
University of Wisconsin-Whitewater
Bioinformatics Minor, 2020-2021**

Date: 5/17/2021

Time: 2-3pm

Place: Webex

Invited: Interim Provost Greg Cook; Interim AVC Kristin Plessel; Dean Frank Goza (L&S); Department Chair Kerry Katovich, Author Robert Kuzoff; faculty and staff in the Bioinformatics program; Audit & Review Team Chair Denise Roseland; Audit & Review team members Tom Klubertanz, Andrea Ednie, Fe Evangelista, Assessment Representative Katy Casey.

- 1) Call to order
- 2) Introductions
- 3) Overview of review team evaluation, program comments
 - a) The Bioinformatics program was created collaboratively by Biology and Computer Science. The assessment plan was that each program would evaluate half to the Bioinformatics learning outcomes. However, the minors did not get assessment attention as both programs got busy and did not have a detailed plan in place. The program is considering proposing a plan to form an advisory committee which will work on the assessment plan
- 4) Discussion of Review Team's evaluation:
 - a) **The committee recognizes the demand for a program like this in the job market but was unclear from the information provided in the self-study if this program is actually viable and delivering value to students. Please share the following: the value added for UWW students, what the program prepares students to know and do, skills and knowledge students need for graduate school or entry level careers in this field.**
 - i) Referred to anecdotal student reports regarding their experiences in the minor – e.g., graduate school placements where students feel they were accepted because they completed the minor. Spoke of two students in particular. The successes of particular students are used as evidence that students are gaining marketable competencies. The program needs to do more marketing regarding student successes to reach additional students.
 - b) **The review team discussed the already demanding nature of degrees that align with this minor (e.g., biology, computer science). This led to a broader conversation about the ability for undergraduate students to successfully complete their major and these minor requirements. Could it be students are selecting other, less demanding minors? Further, if other programs tend to offer this set of knowledge and skills at the graduate level, could it be that the skills necessary in this field require foundational knowledge acquired in an undergraduate degree, and possibly some employment experience?**
 - i) The hope is that the minor serves UWW students and not a more elite program. Some current students were not elite when they started the minor. Discussed how many students don't understand what bioinformatics is – and that may be keeping students from understanding its worth. Discussing the potential for instructors in more general courses to infuse bioinformatics concepts into their courses. We also discussed the need to better market/explain the minor on the website.
 - ii) Also discussed how some of the required coursework (Java, C++) may not be necessary and may be keeping students from wanting to complete the minor. Faculty are considering curriculum changes, but

want first to survey students for their feedback about the minor.

- iii) We also discussed what types of students the minor may attract – including math, statistics and environmental science majors in particular. The prerequisites on courses in the minor may make it difficult for these students to complete the minor in addition to their major.
- iv) Provost Cook: The question of accessibility to students is important due to resources (coordinator and faculty/staff time, etc.). Enrollment has been low – 9 students last year, 2 this year. We currently have 36 minors with enrollments less than 10 students. Provost Cook is impressed with the value of the minor, but concerned about resources. The challenge is how to better market the minor, and help people in the region to understand the benefits of this minor. It's important for the program to consider the return on resource allocation and potential for this minor.
- v) Program responded that they think now that an advisory board is formed and there is a proposal with adjustments they would like to give it another 5-years to see what can be done

c) Please describe the current program management plan. How are meetings scheduled and held and how is work associated with long-term goals setting and assessment distributed?

- i) Need to develop a prioritization plan for the work that needs to be done. The leadership team is meeting to develop a plan.
- ii) Dean Goza reaffirmed the need to develop an assessment plan and improve information sharing about the minor.
- iii) If industry partners are contacted, try to bring them to campus or work with Marketing and Communications to share these opportunities and highlight opportunities to help with awareness.

5) **Recommended Actions:** The evaluation report lists three recommended action (see page 12, point 4) related to program viability, management, assessment, and enrollment.

6) **Recommended Result:** *Continuation with major concerns in one or more of the four areas*

- Please make use of the detailed comments in the evaluation report (below).
- Please select all applicable boxes and fill in the appropriate year:
 - Next FULL self-study will be due to the Dean on October 1, 2025 and to the Assessment Office on November 1, 2025
 - Next SHORT self-study will be due to the Dean on October 1, 2024 and to the Assessment Office on November 1, 2024.
 - A progress report will be due Oct. 15 to Dean, Nov. 1 to Assessment, of 2022. ****Please note the differences in the two progress reports requested in fall 2022 and fall 2023 (see pg. 13 for details)**

7) Adjourn.

Review team report is attached below, including Recommended Actions and instructions for Progress Reports (if required).

**University of Wisconsin-Whitewater
Review of Audit & Review Self-Studies
Undergraduate Programs, 2020-2021
Majors/Minors and Standalone Minors**

Date of Evaluation 4/14/2021 Short Self Study (SS*) _____

Program: Bioinformatics Minor Major Minor

Evaluations submitted by: Andrea Ednie, Katy Casey, Denise Roseland, Fe Evangelista, Tom Klubertanz

Review meeting attended by: Andrea Ednie, Katy Casey, Denise Roseland, Fe Evangelista, Tom Klubertanz

I. General Program Information

1. The program's mission statement reflects the nature and scop

Sufficient Evidence	5
Some/Partial Evidence	0
No/Limited Evidence	0

2. The program is aware and reflective of changes affecting improvement since the last review.

Sufficient Evidence	4
Some/Partial Evidence	0
No/Limited Evidence	1

3. Characteristics of the program set it apart from others when compared regionally and nationally. The unique aspects of the program attract students.

Sufficient Evidence	3
Some/Partial Evidence	2
No/Limited Evidence	0

4. The program has been responsive to actions recommended from the previous Audit and Review Reports; Progress Reports have been submitted, if relevant.

Sufficient Evidence	5
Some/Partial Evidence	0
No/Limited Evidence	0

5. The program has achieved or maintained program-level accreditation or has considered seeking it, where appropriate (only select N/A if there is no accreditation available).

Sufficient Evidence	0
Some/Partial Evidence	0
No/Limited Evidence	0
N/A	5

General Comments related to Section I

I. Items 2 and 4 do not apply since this is the program's first self-study. It was not clear what characteristics may set this program apart from others, besides the fact that it is a minor.

The mission statement seems complete and descriptive, but I did not read it and understand the program- what is bioinformatics? I am not sure this is a problem as those in the field may already have a good understanding.

No other school in the UW-System offers this minor; no evidence was provided that shows that the program attracts students majoring in other STEM fields or that it increases likelihood of employment

2. First self-study for the program.

II. Alignment within the University

1. The program contributes to the fulfillment of UW-Whitewater's Mission and Strategic Plan.

Sufficient Evidence	4
Some/Partial Evidence	1
No/Limited Evidence	0

2. The program supports general education and/or proficiency programs at the University.

Sufficient Evidence	4
Some/Partial Evidence	0
No/Limited Evidence	1

3. The program is collaborative and supports other academic programs across the College and/or University.

Sufficient Evidence	4
Some/Partial Evidence	0
No/Limited Evidence	1

General Comments related to Section II

2. Supports General Education by requiring additional GE designated courses. 3. Minor would increase job marketability for students in various (listed) majors.

The interdisciplinary nature of this minor is a real strength and a value to the University.

The program compliments a variety of majors on campus.

#1 - the first answer provided is just a copy of the program's mission statement without directly referencing its relation to the university's mission. #2 - math and programming skills are required for students in the program #3 - the program is interdisciplinary so it should be collaborative, but no details were given

3. It is interdisciplinary.

III. Program Goals & Accomplishments

1. Goals and objectives were identified and undertaken to improve/advance the program.

Sufficient Evidence	1
Some/Partial Evidence	0
No/Limited Evidence	4

2. Goals currently in place will contribute to the program's advancement. Criteria for determining success were measurable and attainable.

Sufficient Evidence	0
Some/Partial Evidence	2
No/Limited Evidence	3

3. The program has a process for setting and assessing goals and making decision about changes to the program.

Sufficient Evidence	0
Some/Partial Evidence	1
No/Limited Evidence	4

General Comments related to Section III

1-3: It appears no goals have been set, and there is no process for setting goals.

III. 1) The only goal provided was to offer the program. 2-3) It is not clear how the program sets goals for program improvement. In addition, there does not seem to be any assessment of the program: "To date no formal assessment plan has been developed for this program."

Being a small program, faculty seem to track and are aware of where graduates have ended up. I think formalizing important data sources and tracking performance is a need for this minor to remain viable and current.

The program described some successes of recent graduates- impressive and notable. However, goals were not listed. There may be a plan in place to set goals, but all that was noted was a plan to start assessing the minor in the Biology and Computer Science programs. It is concerning that plans to meet and begin this work were not described. Considering the additional workload of interdisciplinary programs, it seems a plan should be in place after 5-years.

3. Advisory committee was proposed.

IV. Curriculum

1. The program has a clearly articulated, efficient, and purposeful curriculum.

Sufficient Evidence	4
Some/Partial Evidence	1
No/Limited Evidence	0

2. The program prepares students in majors, minors, and related emphases tracks in post-graduation and other applicable experiences.

Sufficient Evidence	2
Some/Partial Evidence	3
No/Limited Evidence	0

3. Appropriate assessment data were used in making curricular revisions.

Sufficient Evidence	2
Some/Partial Evidence	1
No/Limited Evidence	2

4. Students participate in the high impact practices.

Sufficient Evidence	3
Some/Partial Evidence	2
No/Limited Evidence	0

General Comments related to Section IV

2. Impressive graduate school placement and student publications data. 3. No curricular revisions made, except MATH/STAT course numbers 4. Collaborative projects, undergraduate research (appears very successful)

IV. 1) Curriculum allows students to pick a focus area. Classes are offered "at least once every two years," is this sufficient to meet students' timeline toward degree completion? 2) I believe the knowledge and skills taught in this minor are valuable- please share more about what specific career paths students' completing this program are best suited.

The curriculum is a bit complicated. I appreciate the amount of student choice, be having students select "focus areas" in a minor. However, from a management and assessment stand point- this can be difficult. The program has not made any curricular revisions to date.

3. Making a Program Assessment Plan was proposed. 4. I am surprised that internships were not encouraged. Are there efforts to coordinate and advertise internships in related programs that could help Bioinformatics? 1. The mismatch between content in the offered computer programming courses and what is used in the job market decreases the value of the minor. I am certain it also affects recruitment of students to the minor, as very few students would excel in three widely different areas, such as biology, statistics, and computer science.

V. Assessment of Student Learning

1. The program has clearly articulated learning outcomes for students.

Sufficient Evidence	2
Some/Partial Evidence	3
No/Limited Evidence	0

2. Student learning outcomes are "mapped" to the curriculum.

Sufficient Evidence	0
Some/Partial Evidence	2
No/Limited Evidence	3

3. The program provided a timeline indicating when faculty and staff assess SLOs. The timeline is manageable and sustainable.

Sufficient Evidence	0
Some/Partial Evidence	1
No/Limited Evidence	4

4. The program collected a variety of appropriate assessment data allowing judgements about the extent to which students are achieving learning outcomes.

Sufficient Evidence	0
Some/Partial Evidence	0
No/Limited Evidence	5

5. Program faculty consider assessment data in making changes to the curriculum, students' learning outcomes, and/or other aspects of the program.

Sufficient Evidence	0
Some/Partial Evidence	0
No/Limited Evidence	5

6. Student learning outcomes are aligned with the LEAP Essential Learning Outcomes in a way that is reasonable and meaningful.

Sufficient Evidence	1
Some/Partial Evidence	3
No/Limited Evidence	1

7. Overall, the program has an appropriate assessment plan for measuring students' progress in attaining the outcomes.

Sufficient Evidence	0
Some/Partial Evidence	0
No/Limited Evidence	5

General Comments related to Section V

1-2. The minor appears to have SLOs, but not sure how they are mapped to courses. 3-5. No assessment plan yet. 6. Aligned with 1 LEAP ELO.

V. The program has not created an Assessment Plan.

In the program proposal, the following was described: "Assessment will be incorporated into ongoing departmental assessment plans for both the Departments of Biological Sciences and Computer Science and partitioned between these units according to our stated learning objectives, with learning objectives 1, 3, and 6 assessed by Biological Sciences and 2, 4, and 5 by Computer Science. Representatives from each department will confer on an ongoing basis to optimize the effectiveness of the minor." However, it does not appear this was done. I find this concerning as the program has been enrolling students for 5-years. The plan now seems to be to create an advisory committee. It seems critical that the first step be a representative group from this minor write an assessment plan.

7. The Advisory Board will need to focus on assessment and program growth. I am glad the program recognizes that.

VI. Student Recruitment, Enrollment, Retention, and Graduation:

A. Trend Data

1. Five-year enrollment and graduation trends reflect program vitality and sustainability.

Sufficient Evidence	0
Some/Partial Evidence	3
No/Limited Evidence	2

2. [MAJORS ONLY] Credits-to-degree show that students can complete the degree in four years, or reasonably efficiently.

Sufficient Evidence	0
Some/Partial Evidence	0
No/Limited Evidence	0

3. [MAJORS ONLY] Program has strategies to recruit and retain students.

Sufficient Evidence	0
Some/Partial Evidence	0
No/Limited Evidence	0

4. Composition of students approximates or exceeds the diversity of students at the University.

Sufficient Evidence	0
Some/Partial Evidence	0
No/Limited Evidence	5

5. Students can enroll in appropriate courses and proceed without delaying graduation.

Sufficient Evidence	0
Some/Partial Evidence	4
No/Limited Evidence	1

6. Claim that the program is oversubscribed, undersubscribed, or at optimum level is justified or supported by examples or data.

Sufficient Evidence	1
Some/Partial Evidence	2
No/Limited Evidence	2

General Comments related to Section VI.A

1. Minor appears low-enrolled so far, but marketing/educational ideas are discussed.

VI. Student enrollment: 2019-20, 6; 2018-19, 6; 2017-18, 5; 2016-17, 4. The enrollment in the program is low and there is no way to determine if the students currently enrolled are successfully meeting program outcomes. The program reports that graduates are successful, but there is no way to know if the knowledge and skills the students acquired in this program played a role (because they were not assessed). VI. 5) The curriculum is clear, but a little confusing as to when courses are offered. One required course is not currently offered- will the program continue to substitute or is there another plan?

The Advisory board seems like an important step for this minor.

Bioinformatics seems to be popular in the science professions, but students may not be aware of what this field entails and/or the value of skills acquired in the program. Was any marketing or student interest information collected prior to its inception? The program enrolled 4-6 students over the past 5-years. Work to promote the program was limited and assessment of student learning was not described in this report. While a brief plan to create an advisory board and plan was mentioned, there were not details, goals, or timeline associated. I wonder if there is enough interest and resources to continue offering this program. Dashboard data shows enrollment in 19-20 as 9 students- if the program enrollment grows 50%, as is hoped, the program would have an enrollment of 12-13, is this optimal and sustainable?

5. The Bioinformatics course not being offered suggests the program is not a priority. 6. I feel the proposed goal of 50% growth over the next 5 years is too conservative given 1) the enrollment currently is so low, and 2) the potential and marketability of the minor is so high.

VI. Student Recruitment, Enrollment, Retention, and Graduation:

B. Demand for Graduates

1. [MAJORS ONLY] Placement information indicates that program graduates find employment or continue their education.

Sufficient Evidence	0
Some/Partial Evidence	0
No/Limited Evidence	0

2. Data suggests that employment opportunities for graduates of this program will remain strong.

Sufficient Evidence	3
Some/Partial Evidence	2
No/Limited Evidence	0

General Comments for VI.B

There was a description of the market for skills associated with this program.

#1 - anecdotal evidence and small number of graduates; it would be helpful to find out how many students went to grad school and how many were employed after earning the bachelor's degree #2 - there seems to be growing demand for Bioinformatics professionals, but is a Bioinformatics minor sufficient for employment in this field?

VII. Resource Availability & Development:

A. Faculty and Staff Resources

1. Information on numbers of full and part-time faculty and staff are provided. Expertise of teaching staff are aligned with the needs and future vision for the program.

Sufficient Evidence	2
Some/Partial Evidence	3
No/Limited Evidence	0

2. Information is provided about changes in the faculty since the last Audit and Review.

Sufficient Evidence	5
Some/Partial Evidence	0
No/Limited Evidence	0

3. The program has identified staffing changes and anticipated areas of potential future need.

Sufficient Evidence	2
Some/Partial Evidence	2
No/Limited Evidence	1

General Comments related to section VII.A

1. Uses faculty and instructors from other departments.

As an interdisciplinary minor with no designated faculty 'owners', what seems important here is how leadership/oversight of the livelihood and relevance of this minor is sustained.

#1 - There is no breakdown of faculty and staff by full, associate, assistant professors and lecturers as requested in the self-study. #3 - staffing is sufficient

1. Instructor information was limited to which instructors usually teach which classes. 3. Do current instructors have sufficient expertise to offer Python and R programming courses?

VII. Resource Availability & Development:

B. Student Resources

1. The program has adequate personnel, student help, and service and supplies to serve its undergraduate students.

Sufficient Evidence	4
Some/Partial Evidence	1
No/Limited Evidence	0

2. The program has adequate facilities equipment, technological, and library resources to effectively serve its students.

Sufficient Evidence	4
Some/Partial Evidence	1
No/Limited Evidence	0

General Comments for VII.B

1. Would like a designated tutor for the minor.

A dedicated tutor seems like an important asset to secure. Wondering about how computer lab access in L & S impacts this minor.

1. A programming tutor is a good idea, but I do not believe that it alone will attract more students to the minor.

VIII. Conclusions and Recommendations from the Department or Program

1. Areas of strength are discussed.

Sufficient Evidence	4
Some/Partial Evidence	1
No/Limited Evidence	0

2. Areas of improvement and continued progress are discussed.

Sufficient Evidence	5
Some/Partial Evidence	0
No/Limited Evidence	0

3. Recommendations and resources are discussed.

Sufficient Evidence	5
Some/Partial Evidence	0
No/Limited Evidence	0

General Comments for VIII

2. Concern that curriculum is needing to be revised and that the required courses may cause students to hesitate before enrolling in the minor. 2. More info about career options within the field of Bioinformatics would be helpful for marketing and recruiting for the minor.

The program noted the benefits of the program and potential for growth. In addition, long term goals were listed under recommendations.

The curricular revisions suggested seem essential to the relevance of the program for students.

The program noted another "closely related minor" of Data Science. This minor has seen significant growth and enrolled 28 students in 2019-20. Why offer another very similar minor? The program identified goals for the future in this section. However, the goals are ambitious and will take dedicated faculty/staff to implement. It is not clear in this report, that the resources to complete this work exist.

VI. Reviewer Conclusions

1. Strengths of the Program

Seems like a great opportunity for students in a range of majors to broaden their academic backgrounds.

Interdisciplinary program that has the potential to appeal to students in the sciences. The career projections for the skills associated with the program seem promising. Information available on graduates of the program suggest they are doing well, and able to pursue advanced studies and opportunities.

The applicable interdisciplinary nature of the minor with high-wage, high-skill, high-demand career opportunities for graduates.

Appears to offer a unique program.

It is an interdisciplinary program that gives students skills in Biology and Computer science, as well as mathematics and statistics.

Clarity of mission and academic niche. Low overhead to offer the minor. Employability.

2. Areas for Work or Improvement

Seems the curriculum may be negatively affecting student enrollment in the minor? - Need to develop goals, an assessment plan, and to consider curriculum revisions.

The program ended the report with very ambitious goals for the next 5-years. It is a little concerning that there was not any progress on these goals in the first 5-years of the program. What is the program's plan to meet these goals in a 5-year period? The program has not completed an assessment plan or collected any data on student learning outcomes. It is difficult to determine if the program is successful without any data as to students' knowledge and skills in the minor.

Curriculum relevance to the career field (Programming languages taught) and the absence of an assessment plan that allows minor faculty to truly know what students know and can do and how it relates to careers and post graduate opportunities after UWW.

There is not a clear indication that there is a market for this minor at UWW. It seems existing minors (e.g., Data Science, Computer Science) may attract the students who would be interested in this minor. In that case, are these programs all competing for the same students already enrolled at UWW? What is the value to that? There is not clear evidence that this minor attracts new students. This is notable considering there is not any data provided for this minor to suggest its impact on student learning.

The minor needs an assessment plan. - It would be helpful for the program to articulate the need for this minor vs. other paths, for example a minor in Biology for computer science majors.

This minor is an underutilized asset for the institution. Having programming courses with more use of Python and R languages may increase overhead costs if it results in creation of new courses. The Advisory Board has several major issues to tackle right out of the box: 1) Recruitment and enrollment, 2) Appropriateness of available computer science courses, and 3) Assessment.

3. Other comments/questions

There were a number of questions answered with the same response, which often did not address the question. I encourage the next team to complete a progress report or self-study review the criteria the review team uses to evaluate the self-study to ensure questions are addressed appropriately.

The advisory board is a good idea. - The program suggested curricular changes that will improve the program and perhaps increase the number of minors. - The minor has few students but uses already existing courses (except for one class) and resources. - Think about the students you want to attract to to the program, and the connection between the minor and the different majors.

Five years since the minor was created went by quickly. In that time, the program has not received enough attention. Without investments of planning and recruitment, it will fade and that would be a shame. I do not believe that a coordinator's course release for such a small program is justified at this time.

4. Recommended Actions (please specify):

1. **Discussion point at face-to-face, that might require elaboration in the progress report:** The committee recognizes the demand for a program like this in the job market but was unclear from the information provided in the self-study if this program is actually viable and delivering value to students. Prior to the progress report, the program should evaluate and determine the following: the value added for UWW students, what the program prepares students to know and do, skills and knowledge students need for graduate school or entry level careers in this field. Consider including an external stakeholders' group in this process and holding the meeting in the next academic year (2021-22).
 **Response to this recommended action is requested October 1, 2022. Responses to items 2-3 are requested in fall 2023.

2. Devise a program management plan that outlines dedicated oversight and strategic management, development SLOs, and an assessment plan. Detailed comments below: *Requested for progress report due October 1, 2023

 - a) Program management: Identifying individuals responsible for regularly planning meetings, goal setting, data collection, management and reporting. Create program meeting schedule with action items identified for each meeting.
 - b) Assessment: Create an assessment plan using the template provided for the self-study. Collect data on at least two SLOs and share how that information is used for program improvement.

3. Revamp the curriculum to reflect better alignment with occupational demands in the field (e.g., programming languages). More information is needed on how the minor aligns with (compliments, supports) target students' majors. *Requested for progress report due October 1, 2023

5. Recommended Result

Insufficient Information in the self-study to make a determination; revise self-study & resubmit.	0
Continuation without qualification. Next self-study will be a shortened one focusing on the Recommended Actions from the current report.	0
Continuation with minor concerns. Progress report may be required, at the discretion of the review team.	0
Continuation with major concerns in one or more of the four areas; submit annual progress report to the College Dean & Associate Vice Chancellor for Academic Affairs on progress addressing the major concerns	5
Withhold recommendation for continuation, place on probation, and require another complete Audit & Review self-study within 1-3 years, at the Committee's discretion.	0
Withhold recommendation for continuation, place on probation, recommend placing in receivership within the college, and require another complete Audit & Review self-study within 1-3 years at the Committee's discretion.	0
Non-continuation of the program.	0
Report not submitted; refer to Provost for action.	0