Biology BS Program Review 2022

Program Review 2020-2021

Biology BS

Program Profile

History

Start with the history of the program at WWU. Discuss relevant trends and issues dealing with the program and the institution. If a program has one or more concentrations, each concentration should be discussed separately. (300 words or less)

In the early 1990's science courses were re-implemented at WWU (then WWC, and women-only) with the hiring of Professor [Emerita] Mary Spratt, Ph.D. This followed a period of approximately 15-years with no science courses at the college. Throughout the '90's the biology major grew slowly with the eventual additions of chemistry and physics faculty – one in each discipline – in the early 2000's. In the early 2010's the biology programs underwent complete faculty turnover and substantial declines in enrollment associated with personnel issues. With the hiring of new faculty between 2011-2017, the curriculum of the program underwent complete revision to better meet the needs of our student body. The most notable changes are that all biology classes required for a major are now taught by full-time faculty, and the program offers more upper division elective options.
The B.A. is now used as a more tailorable option next to the B.S., in which separate concentrations for veterinary and human medicine now exist. In recent years the program has received very useful capital donations/allocations for updated equipment and funding for small faculty-led, student-based research projects. However gaps still exist in preparing our students for modern biological sciences and medicine (e.g. plant sciences and some lynchpin molecular techniques). Space and staffing continue to be problems with current enrollment: all faculty operate on overloads, numerous courses are staffed by adjuncts (mostly General Education), and the infrastructure of the science building is often too small and suffers from deferred maintenance.

Program Mission

Provide the mission of the program and describe how the program supports the university mission. Discuss the philosophy or purpose of your program, how the program relates to the mission, vision and goals of the University.

University Mission Statement: William Woods University promotes a student-centered learning environment valuing inclusion, creativity, and intellectual inquiry. Focused on professions-oriented education, we prepare learners for success.
Biology B.S. Mission: A program designed in a small liberal arts environment to foster intellectual inquiry, scientific creativity, and prepare students for acceptance into graduate or professional programs, or immediate biology or health-based careers.
The Biology program's mission is aligned with the University's mission. We conduct educational programs through impassioned small group and one-on-one interactions among undergraduate students and expert scientific scholar-practitioners. Students practice real, laboratory-based, inquiry-driven scientific methods thereby gaining training and skills making them competitive and career-ready.

Student Demographics

Student Demographic Reflection

Include any additional demographic information used by the program here. Also provide a longitudinal review of program demographic data. What are the trends in the enrollment as well as retention/graduation data. What strategies has the program used in the past 5 years to maintain/improve these numbers?

The Biology BS had seen a steady number of incoming freshmen between fall 2015 and spring 2020, averaging 63 Biology BS students per year. Our lowest enrollment numbers were in the 2017-2018 academic year, in which we only 57 Biology BS students. We have not been able to consistently retain our freshman Biology BS majors, with retention being

as low as 55.6% for the 2016-2017 class, and as high as 81.3% for the 2017-2018 class. We do have students who remain a Biology major, but often change from PreVet to PreMed or to a Biology BA, and it is unclear how these changes within the program affect retention rates. In addition, our number of new incoming majors dropped 46% from 2019-2020 to 2020-2021. While we don't have the official numbers, it is looking as though the 2021-2022 enrollment in the Biology BS program will be even lower. While the COVID pandemic could be a factor, considering other similar size universities and colleges have had record breaking years enrollment during the same time period, the The Biology Faculty part of the decline in enrollment is due to the overall serious decline in student enrollment at WWU as a whole. This is supported by the fact that since 2015-2016 William Woods University has had an ~13% decrease in undergraduate enrollment, and a 25% decrease in undergraduate enrollment in a ten year time span (2010/2011 - 2020/2021). It is our hope with a new Director of Admissions this program will see an increase in numbers.

	Incoming Freshmen	Transfer	Total
2019-2020	26	2	65
2018-2019	26	0	65
2017-2018	16	4	57
2016-2017	18	1	63
2015-2016	11	2	66

Concentrations
Create a chart that provides the student enrollment in program concentrations. Make a column for each year and a row for each concentration for the identified academic years.

The Standard Concentrations within the Biology BS Program are (1) Pre-Med and (2) Pre-Vet; however, as noted in the section above - during the attempt to generate a Nursing Program, the a third Concentration was added to the Biology BS degree - (3) Pre-Nursing. As of Spring 2020, the Pre-Nursing Concentration has been removed.

	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Pre Vet	43	34	15	22	25
Pre Med	27	36	22	23	27
Pre Nursing				3	2

Program Demographic Data
Upload the program page from the Institutional Research office program data for this program.

William Woods University													
Assessment Data													
Program: Biology (BS)													
		10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	
Declared Majors (as of Oct. 15)	Incoming Freshman	16	7	5	20	14	11	18	16	26	26	14	
	Transfers	2	0	0	3	0	2	1	4	0	2	1	
	Total	39	29	23	53	48	66	63	57	65	65	62	59%
	Undergraduate Enrollment	1,179	1,079	1,009	1,006	1,006	1,001	973	956	934	874	882	-25%
Concentrations													
	Pre Vet	28	29	30	47	42	43	34	15	22	25	31	
	Pre Med	2	2	4	11	9	27	36	22	23	27	27	
	Pre Nursing									3	2	1	
Graduated Majors		2	4	1	6	4	17	14	16	13	6		
Retention Rate: IPEDS definition[1]													
University		66.8%	76.2%	70.5%	76.3%	74.5%	74.5%	77.00%	74.0%	75.90%	77.70%		
Program		100%	66.6%	84.6%	78.2%	92.3%	72.7%	55.6%	81.30%	68.80%	72.20%		
Graduation Rate: IPEDS definition[2]		04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	
University		52.4	50.2	50.5	56.3	52.4	51.2	54.5	59%	57.50%	55.40%	49.80%	
Program		0	0	0	20%	25.%	36.3%	56.2%	NA	75%	60.00%	65.20%	
Graduation Rate: Transfer Students[3]													
University		71.2%	68.8%	63.2%	66.7%	67.4%	69.9%	68.4%	NA	54.10%	70.40%	62.30%	
Program		0	100	0	33.3%	0/0	100%	NA	NA	25%	60%	33%	
[1] = % of full-time, first-time students that return to the institution in the subsequent fall semester													
[2] = % of the full-time, first-time cohort that graduate within 6 years													
[3] = % of transfer students new to the institution in the fall semester that graduate with a bachelors level degree													

Reflection on Program Enrollment Data

Clearly describe the approach of the program maintain or improve student retention and graduation rates. Does the program have an active plan on retention of current students? if so, specificy the details of the plan.

Our Department has a program goal of 75% retention between freshman and sophomores, a 90% persistence per year, and with a 100% completing the program that enter their senior year. By our program goal mentioned above, we would expect a graduation rate ~60%.

The retention data shows that 68.8% for students that entered during 2018/2019, so we did "Not Meet" our benchmark, but the University as a whole only had a 75.9% retention rate for this year, which is down from 83.9% for the previous year.

This smaller retention rate than the University may be due to the large amount of faculty turnover in the Science program has seen over the last several years. We also feel the fact that the "Pre-Nursing" concentration is under the Biology BS degree and there has been a lot of turn over and confusion with the program not receiving state certification, those number could have an impact on our retention numbers. In addition, Exercise Science started a "Pre-Physical Therapy" concentration, and there is the possibility we may have loss a few students to them changing their major to Exercise Science.

There is also the problem of the number of students enrolled in the three BS concentrations still does not equal the total number of declared as a Biology BS major. This inconsistency in data makes it extremely difficult to truly determine which Biology BS students are being retained and which are leaving the program.

*****The PreNursing Concentration was only meant to be a "holding spot" for PreNursing students as the BSN program was being developed, so we knew this would affect our retention rates and our graduation rates. The current two PreNursing students never intended to complete a BS degree in Biology, as their goal was to apply for acceptance in the WWU BSN program once approved. The development of a PreNursing BA degree was supposed to occur so that all new incoming "PreNursing" students would be placed into that program; however, that never occurred and the Director of Nursing left the University in December 31, 2019. In February 2020, it was announced that William Woods University was pulling the application we had at the state board for review and that WWU would only be continuing the RN to BSN on-line completion program. This left any Pre-nursing students (both incoming and second year students) with the lack of a degree to pursue here at William Woods. We know several of those Pre-Nursing students left the University in January

(after the fall 2019 semester) and openly expressed they were not planning to return next fall (Fall 2020). Therefore, we know this affected our retention rate for the 2019-2020 year and will have future effects on our Biology BS graduation rates in the years to come. We want to be sure to note the PreNursing Concentration here because we were worried about this issue at the onset, and so it is officially documented in case our retention and graduation rates are lower than except in the future assessment report, and it is clear why we "lost" a specific sub-population of our Biology BS students.

Additional Program Resources
If your program has any additional syllabi, handbooks, policies that would be beneficial to an external reviewer and the academic council, please upload here.
BIO_4_Year_Planning_Presentation_Fall_2021.pptx

Advising
Please describe the advising load, including the average number of advisees for each faculty member within the program. What strategies do program faculty use to achieve successful degree completion and graduation success? How is advising managed by the program faculty?

Faculty average between 15–25 advisees and there have been times during faculty turnover that our advisee load got as many as 30–35 advisees. A new director of academic advising is trying to keep the advisee load lower than 20 per faculty. It is important to note that the Biology Faculty are worried if faculty other than those who teach courses in the major are advising our majors. This is due to the fact our two concentrations (PreMed and PreVet) have a large number of credit hours and some courses are only taught every other year. Missing a course in the major could extend the semesters they are here or require trying to take a course through the Mid-Missouri Associated Colleges and Universities (MMACU) institutions.
Every year in late September/early October the Biology Department holds a 4-year planning session for all of our Biology Majors Program (see document in additional program resources). The event is specifically designed to help our incoming students Biology Majors make a four-year plan prior to their first advising appointment. Our juniors and seniors assist in helping our new students, as do the faculty, to help develop a plan that will allow them to meet all of their degree requirements in four years. Our sophomores often tweak and/or modify their four-year plan during this event, as they now have a better understanding of the Biology program and their particular interests. We feel our yearly planning event helps keep our students on track to complete their degree in a time they specify as well as providing them the opportunity to take some ownership in their degree plan.

Internship & Placement

Student Internship Demographics
Use the attached chart or fill in your own data on the students completing an internship during the 5-year timeframe.

The Biology Programs do not have a required or formal internship as part of the curriculum. Biology students are highly encouraged to seek internship opportunities, shadowing expereiences, and patient contact hours over the summer and the Biology faculy assist in many ways to help those students find and obtain meaningful summer internships. However, since it is not part of the Biology curriculum we do not keep official data on internships.

Internship Data Upload
If you did not use the above text box for the internship data, please upload your data here.

The Biology Programs do not have a required or formal internship as part of the curriculum, so we do not keep official data on internships.

Graduate Placement Data

Employment in Field
What types of positions are considered relevant to the "Field" of study with this program? Please define what it means for students to be employed 'within the field' of the professional discipline

The two Concentrations in the Biology BS program are specifically designed to help students get into various professional and graduate school**s.** Therefore, the jobs relevant to the "employment in the" of study tend to be jobs in the veterinary field (either as a Vet or Vet Technician) and in various aspects of human health and medicine (Medical Doctors, Physician Assistants, Nurses, Physical Therapist, Occupational Therapist, Pharmacists, etc.). We have students employed and/or currently gaining degrees in all of the jobs mentioned. Our PreVet students often find employment at various types of Equine facilities because of the large number of equine courses associated with that concentration, so some types of positions in the equine industry are considered "in the field." Really any job in which their knowledge of the sciences (Biology, Chemistry, Physics) or their equine health knowledge was a reason for them gaining employment is counted as "Employment in the Field."

Graduate Placement Data
Please upload your data in the chart provided, either as an attachment or in the text box as a screenshot.

	2015-2016	2016-2017	2017-2018	2018-2019	2019-2020
Graduated Students	17	14	16	13	6
Employed within the Field	4	6	5	3	1
Employed outside the Field	1	1	1	1	0
Graduate/Professional School	6	8	9	7	4
Unknown	10	1	5	4	1

Program Curriculum

Curriculum: Rotation
Review enrollment trends by course. Are there particular courses that are not meeting enrollment goals?

All our required courses make and are offered at appropriate rotation. Some classes are offered every year, and others are every other year (see attached). We do not have any required courses that we offer every semester. No changes to course rotations are recommended at this time, though we have trimmed down the number of sections in General Biology II and Genetics as University enrolled trends have dipped over the last couple years. These are courses that still fill a

single lab section and we hope as enrollment rebounds, we will offer multiple lab sections again soon. Neither of those classes are options for offering every other year as they are required for all second semester and third semester BIO students. Additionally, General Biology II is a pre-requisite for all of the upper division biology courses.

Curriculum: Delivery Mode
Does online enrollment impact campus enrollment? Is there a notable difference in enrolment between online and campus classes, where one is regularly fuller than the other?

None of our courses that are part of the biology major or minor curriculum are offered online. Some of the online Gen Ed courses have probably impacted on-ground enrollment of non-majors classes in biology, but with reduction in funds for adjuncts, there is currently only one BIO Gen Ed offered on ground. This is not including General Biology I or II, which are part of the core curriculum, are Gen Eds, but are also geared specifically for Biology majors. That will be reflected when they are rebranded starting Fall 2022 to discourage students to take the class solely as a General Education requirement.

Curriculum: Revision
Explain any curricular revisions made since the lst Program Review. What prompted the changes to curriculum? Were the changes prompted by student learning and assessment data or personnel changes? Did the curriculum changes produce the desired outcomes?

The BA and BS have both undergone some revisions since the last Program Review.
We changed the *Upper-Level BIO/CHM Electives 11 hours* to: Upper-Level BIO Electives 10 hours
Rationale for change of BIO/CHM Electives to Only BIO Electives:
As this is a Biology Major, we feel the upper division electives for students majoring in Biology, should solely be from our Biology curriculum. In having our students choose all of their upper division electives from Biology we are providing them with a wider breadth of knowledge and diversifying their experiences within Biology.

Rationale for change from 11 credit hours to 10 credit hours of electives:
As more courses and topics in Biology are designed and taught in the Biology Department, not all classes lend themselves to having a lab component. This is either due to there being extreme cost associated with a laboratory component (immunology) or a Biology topic just does not lend itself well to having/needing a lab (conservation biology). As we broaden the types of courses offered in the Biology program, it is possible we will increase those courses without a laboratory component. Therefore, it is important to change our upper division credit requirements to allow students the greatest flexibility in the courses they choose for their completing their Biology program.
This change to the B.S. Pre-Med Concentration degree program will change the overall credit hours required from 67 – 68 credit hours by one credit hour to 66 – 67 credit hours.

Proposed changes to the Bachelor of Science (B.S.) in Biology with a Pre-Vet Preparation Concentration:
1. Change the Upper-Level BIO/CHM Electives 11 hours to: Upper-Level BIO Electives 10 hours
2. Delete the 3-credit hour Equine Elective
3. Add EQU118 (3-credit hours) as a requirement under the Pre-Vet Concentration Requirements
4. Delete BIO324/325 Organic Chemistry II lecture/lab (4 credit hours) from the Pre-Vet Concentration Requirements

Rationales:
Rationale for the change in the Upper-Level Electives
These changes to the B.S. Pre-Vet program are the same in this degree as the rationale for the changes the other two Biology programs and are stated in the B.A. degree program (see above).
Rationale for deleting the 3-credit hour Equine Elective and for adding EQU118 (3-credit hours) as a requirement under the Pre-Vet Concentration Requirements:
Under the current catalog, Pre-Vet students are required to get 3 credit hours from one of three Equine options: 3 Riding Classes (1 credit each) Stable Management (3 credits), or Equine Evaluation (3 credits). These courses were originally included in the degree as an incentive to get individuals interested in Equine and Biology. Due to the success of qualified students entering Veterinary School, approximately half of our Biology Majors are currently declared as Biology Pre-Vet majors. Since our Pre-Vet students do not need these additional courses because they are not essential to our student's entering Vet School and the course requirements for Veterinary Schools is already incredibly high, we would like to remove the 3-credit hour Equine elective from this Biology degree program.

In addition, during the last year the pre-requisite requirements for many of the Equine courses have changed. The Equestrian department is now using a sequential course series, EQU117 and EQU118, for one of equine courses our Pre-Vet majors are currently required to take (EQU376 – Equine Anatomy & Physiology). By deleting the Equine Elective 3 credits, we can add the additional pre-requisite EQU118 to the Pre-Vet Concentration requirements and remove any hidden pre-requisites. This will make the path to completing the Equine portion of the Pre-Vet Concentration degree program more straight forward for both students and advisors.

We have had multiple discussions with the Equestrian Division Chair (Jennie Petterson) and the Director of Academic Advising (Bonnie Carr), and both are in favor of this change and do not feel it will negatively impact their classes. Both individuals are also very supportive of not having hidden pre-requisites from an advising standpoint. In addition, both individuals have agreed that if a student is declared as a B.S. Biology with a Pre-Vet Concentration, these students will still be put in the pool for pre-registration in Riding classes, if the student chooses/wishes to take riding classes.

Rationale for deleting BIO324/325 Organic Chemistry II lecture/lab (4 credit hours) from the Pre-Vet Concentration Requirements

Currently, students declared as a B.S. in Biology with a Pre-Vet concentration are required to take 20 credit hours of chemistry courses, resulting in an embedded Chemistry minor within their Biology degree. While the Biology faculty understand the importance of the Chemistry courses, we do not feel any minor should be embedded within a major degree checklist. In addition, several Veterinary schools (~25%) have dropped the requirement of two semesters of Organic Chemistry starting in the applications due Fall 2017. The majority of Veterinary Schools have gone to a Biochemistry course (which has an Organic Chemistry Pre-requisite) as one of the course requirements for admission to their program.

Students will still be advised of the option of declaring a Chemistry minor and of the benefits of taking a second semester of Organic Chemistry. However, the faculty would like to remove the CHM324/325 Organic Chemistry II lecture/lab requirement from this degree programs.

Conclusion of changes to the B.S Biology with a Pre-Vet Preparation Concentration changes:

Even with the changes we propose here, students in this degree program will still be required to complete 73 – 75 credit hours for the completion of this concentration within our B.S. Biology degree program.

These changes result in an overall decrease of the concentration by 5 credit hours, from 78 – 80 credits in the 2016 -2017 catalog to 73 – 75 credits proposed for the 2017 -2018 catalog. These changes will help students in this concentration streamline the pre-requisites within the Equine portion of the degree, allow a bit more flexibility in scheduling of their upper level elective options for the program, and remove a minor from within a major checklist. Due to the large course requirements for admission by Veterinary schools, this program still has a large credit requirement so while the program is decreasing in credit hours we feel the changes will actually strengthen the Pre-Vet concentration in our B.S. Biology degree program.

In addition, we dropped BIO 317/318 Comparative Vertebrate Anatomy and Physiology from the pre-med concentration forcing pre-med students to take BIO 313/314 Human Anatomy and Physiology.

BIO 317/18 has all had a name change from Comparative Vertebrate Anatomy and Physiology to Comparative Anatomy and Physiology. This reduces overlap with Vertebrate Zoology and allows the course to focus more on animal physiology and less about vertebrate natural history.

Curriculum: Shared Curriculum

List program courses that are required by other academic programs or that are cross-listed with other academic programs. How do these courses impact the program (ie: increased class size/need for faculty overloads to teach additional sections, ect? How often is the shared course offered? Has the rotation changed for shared classes?

Course offered	Supported Programs
BIO 114/115 (Fall only)	Exercise Science
BIO 124/125 (Spring only)	Exercise Science
BIO 313/314 (Fall only)	Exercise Science
BIO 323/324 (Spring only)	Exercise Science
BIO 343 (even Springs)	Exercise Science
BIO 412 (odd Springs)	Exercise Science

The primary impact of sharing these courses with Exercise Science majors is that we had to start offering BIO 313/314 and BIO 323/324 every semester. It has also led to additional sections of BIO 114/115 and BIO 124/125, though I suspect that will be reduced once we return to having primarily students who need those classes for their degrees taking them instead of students taking them as general education courses. Future enrollment trends will determine the impacts

on BIO 343 and BIO 412. As of now, they are still okay being offered every other year as they do not have labs and so can have enrollment up to 30 students.

Curriculum Enrollment
Attach the Curriculum enrollment for all program courses.

	Pre-Med Concentration																				
Courses		2010-2011		2011-2012		2012-2013		2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020	
		Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
MAT 124	Calc I	38/40	N/A	30/60	N/A	36/60	N/A	24/60	N/A	18/25	N/A	15/25	N/A	19/25	N/A	17/25	N/A	12/25	4/25	15/17	12/25
	Biology Electives: AN/Atomy & Physiology - 4 credits																				
BIO 313	Human AN/Atomy and F	14/16	N/A	N/A	N/A	19/20	N/A	N/A	N/A	14/16	N/A	N/A	N/A	28/30	N/A	N/A	N/A	11/30	N/A	16/30	N/A
BIO 314	Human AN/Atomy and F	14/16	N/A	N/A	N/A	19/36	N/A	N/A	N/A	14/16	N/A	N/A	N/A	28/32	N/A	N/A	N/A	11/16	N/A	16/16	N/A
BIO 317	Comp vertabrate A&P	N/A	N/A	N/A	07/16	N/A	N/A	N/A	15/16	N/A	N/A	N/A	16/16	N/A	N/A	N/A	13/16	N/A	N/A	N/A	15/16
BIO 318	Comp vertabrate A&P Li	N/A	N/A	N/A	07/16	N/A	N/A	N/A	15/16	N/A	N/A	N/A	16/16	N/A	N/A	N/A	13/16	N/A	N/A	N/A	15/16
	Chemistry Electives - 4 credits																				
CHM 324	Organic Chemistry II	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18/40	N/A	20/40	N/A	16/40	N/A	15/40	N/A	10/40
CHM 325	Organic Chemistry II Lat	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	18/40	N/A	20/40	N/A	17/40	N/A	15/20	N/A	10/40
CHM 440	Biochemistry	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20/20	N/A	19/20	N/A	20/20	N/A	11/20	N/A	9/20
CHM 441	Biochemistry Lab	N/A	13/20	N/A	N/A	N/A	12/14	N/A	06/20	N/A	19/20	N/A	20/20	N/A	19/20	N/A	20/20	N/A	11/20	N/A	9/20

	Pre-Vet Concentration																				
Course		2010-2011		2011-2012		2012-2013		2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020	
		Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
BIO 303	Microbiology	N/A	12/13	N/A	01/01	N/A	16/17	09/16	N/A	N/A	N/A	20/20	N/A	12/20	N/A	19/20	N/A	9/20	N/A	15/20	N/A
BIO 304	Microbiology Lab	N/A	12/13	N/A	01/01	N/A	16/17	09/16	N/A	N/A	N/A	20/20	N/A	12/20	N/A	19/20	N/A	9/20	N/A	15/20	N/A
CHM 440	Biochemistry	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	20/20	N/A	19/20	N/A	20/20	N/A	11/20	N/A	9/20
CHM 441	Biochemistry Lab	N/A	13/20	N/A	N/A	N/A	12/14	N/A	06/20	N/A	19/20	N/A	20/20	N/A	19/20	N/A	20/20	N/A	11/20	N/A	9/20
EQU (EQS) 117	Theory of Performance: Horse Health MaN/Agement I	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	35/45	31/90	34/45	39/90	29/45	45/90	30/45	33/90	36/50	27/70
EQU (EQS) 118	Theory of Performance: Horse Health MaN/Agement II	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	24/45	14/45	20/45	29/90	16/45	32/50	32/70
EQS 376	Equine AN/Atomy & Physiology	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5/20	N/A	8/20	N/A	5/20	N/A	7/20
EQS 404	Vet med & reproduction	24/21	01/01	60/60	N/A	32/30	N/A	39/30	N/A	30/30	N/A	30/30	N/A	22/30	N/A	11/30	N/A	16/30	N/A	19/30	N/A
	Biology Electives all Concentrations: Field Courses - 4 credits																				
BIO 330	Ecology	N/A	N/A	17/20	N/A	N/A	N/A	07/20	N/A	N/A	N/A	20/20	N/A	N/A	N/A	22/25	N/A	N/A	N/A	18/20	N/A
BIO 331	Ecolgoy Lab	N/A	N/A	17/20	N/A	N/A	N/A	07/20	N/A	N/A	N/A	20/20	N/A	N/A	N/A	22/25	N/A	N/A	N/A	18/20	N/A
BIO 333 (310)	Verbate Zoology	13/16	N/A	N/A	N/A	05/20	N/A	N/A	N/A	25/25	N/A	N/A	N/A	19/20	N/A	N/A	N/A	16/20	N/A	N/A	N/A
BIO 334 (322)	Vertebrate Zoology Lab	13/16	N/A	N/A	N/A	05/20	N/A	N/A	N/A	25/25	N/A	N/A	N/A	19/20	N/A	N/A	N/A	16/20	N/A	N/A	N/A
BIO 430	Tropical Ecology	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6/16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9/16	N/A	N/A
BIO 431	Tropical Ecology Lab	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	6/16	N/A	N/A	N/A	N/A	N/A	N/A	N/A	9/16	N/A	N/A
	Math Elective All Concentrations - 3 credits																				
MAT 124	Calc I	38/40	N/A	30/60	N/A	36/60	N/A	24/30	N/A	18/25	N/A	15/25	N/A	19/25	N/A	17/25	N/A	12/25	4/25	15/17	12/25
MAT 304 (204)	Biological Stats	N/A	N/A	N/A	N/A	N/A	N/A	N/A	09/30	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	22/25	N/A	12/25

Required Courses- 36 Credits

Course		2010-2011		2011-2012		2012-2013		2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020	
		Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring
BIO 114	Gen Bio I	35/40	N/A	33/40	N/A	30/40	N/A	54/60	01/01	54/60	N/A	51/60	N/A	39/80	19/30	46/80	N/A	70/80	N/A	60/80	N/A
BIO 114 MMA	Gen Bio I	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1/1	N/A	N/A
BIO 115	Gen Bio I Lab	35/40	N/A	33/40	N/A	30/40	N/A	53/60	01/01	54/60	N/A	51/60	N/A	39/60	N/A	46/60	N/A	70/80	N/A	60/69	N/A
BIO 115 MMA	Gen Bio I Lab	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1/1	N/A	N/A
BIO 124	Gen Bio II	N/A	34/40	N/A	23/40	N/A	28/40	N/A	33/40	N/A	31/40	N/A	29/40	N/A	26/40	N/A	28/40	N/A	47/80	N/A	37/40
BIO 125	Gen Bio II Lab	N/A	34/40	N/A	23/40	N/A	28/40	N/A	33/40	N/A	11/20	N/A	29/40	N/A	26/40	N/A	28/40	N/A	47/60	N/A	37/40
BIO 231	Genetics	N/A	N/A	30/30	N/A	07/20	N/A	33/40	N/A	N/A	N/A	29/30	N/A	23/40	N/A	20/40	N/A	26/40	N/A	22/40	N/A
BIO 232 (231)	Genetics Lab	N/A	N/A	30/30	N/A	07/20	N/A	33/40	N/A	N/A	N/A	29/30	N/A	23/40	N/A	20/40	N/A	26/40	N/A	22/40	N/A
BIO 401	Evolution	N/A	N/A	01/01	N/A	N/A	11/20	N/A	10/20	N/A	9/20	N/A	21/30	N/A	20/20	N/A	18/20	N/A	16/20	N/A	12/20
BIO 450	Biology Practicum	09/10	N/A	10/10	N/A	08/10	N/A	09/10	N/A	8/20	N/A	20/20	N/A	17/30	24/30	N/A	12/30	N/A	10/30	N/A	24/30
CHM 114	Gen Chm I	37/40	N/A	28/40	N/A	33/40	N/A	51/60	N/A	38/60	N/A	49/70	N/A	34/60	24/60	39/80	N/A	54/80	N/A	52/80	N/A
CHM 115	Chen Chm I Lab	37/40	N/A	28/40	N/A	33/40	N/A	51/60	N/A	38/60	N/A	49/60	N/A	34/60	34/80	39/60	N/A	54/60	N/A	52/60	N/A
CHM 124	Gen Chm II	N/A	33/40	N/A	18/40	N/A	24/40	N/A	42/60	N/A	27/40	N/A	32/40	N/A	N/A	N/A	28/40	N/A	34/40	N/A	36/40
CHM 125	Gen Chm II Lab	N/A	33/40	N/A	18/40	N/A	24/40	N/A	42/60	N/A	31/40	N/A	32/40	N/A	N/A	N/A	28/40	N/A	34/40	N/A	36/40
CHM 314	Organic Chm I	12/21	N/A	23/20	N/A	09/30	N/A	15/20	N/A	28/40	N/A	27/40	N/A	22/40	22/40	21/40	N/A	19/20	N/A	19/20	N/A
CHM 315	Organic Chm I Lab	14/21	N/A	23/30	N/A	04/30	N/A	15/30	N/A	28/40	N/A	27/40	N/A	22/40	22/40	21/40	N/A	20/40	N/A	19/40	N/A
PHY 201	Physics I	24/24	N/A	17/20	N/A	13/20	N/A	17/20	N/A	20/20	NO	29/30	N/A	25/30	N/A	11/30	N/A	17/30	N/A	27/30	N/A
PHY 202	Physics I Lab	24/24	N/A	17/20	N/A	13/20	N/A	17/20	N/A	20/20	N/A	29/30	N/A	25/30	N/A	11/30	N/A	17/30	N/A	27/32	N/A
PHY 212	Physics II	N/A	19/20	N/A	12/20	N/A	08/28	N/A	15/20	N/A	12/20	N/A	28/30	N/A	25/30	N/A	8/30	N/A	16/30	N/A	23/30
PHY 213	Physics II Lab	N/A	19/20	N/A	12/20	N/A	08/20	N/A	15/20	N/A	12/20	N/A	28/30	N/A	25/30	N/A	8/30	N/A	16/30	N/A	23/30

Program Checklist
Attach the Program checklist from the most recent Academic Catalog

B.S. BIOLOGY – 67 to 80 credits **2014-2015 Catalog**

ID#:_____

Name:_____ **Advisor:**_____

*****Students are required to have 122 distinct credits for graduation*****

Concentration:_____

REQUIRED CORE COURSES 36 credits

Course	Credit	Semester Completed	Grade Earned	Substitutions
BIO114 General Biology I	4			
BIO115 General Biology I Lab	0			
BIO124 General Biology II	4			
BIO125 General Biology II Lab	0			
BIO231 Genetics	4			
BIO231 Genetics Lab	0			
BIO401 Evolution	3			
BIO450 Senior Practicum	1			
CHM114 General Chemistry I	4			
CHM115 General Chemistry I Lab	0			
CHM124 General Chemistry II	4			
CHM125 General Chemistry II Lab	0			
CHM314 Organic Chemistry I	4			
CHM315 Organic Chemistry I Lab	0			
PHY201 Physics I	4			
PHY202 Physics I Lab	0			
PHY212 Physics II	4			
PHY213 Physics II Lab	0			

Required Field Course 4 credits

Course	Credit	Semester Completed	Grade Earned	Substitutions
BIO310 Vertebrate Zoology	4			
BIO322 Vertebrate Zoology Lab	0			
BIO330 Ecology	4			
BIO331 Ecology Lab	0			
BIO400 _____ *Approved Field course w/lab	4			

Required Concentration 16-29 credits

Course	Credit	Semester Completed	Grade Earned	Substitutions
***Pre-Med Preparation Concentration:**	**16**			
A&P Elective	**4**			
BIO313 Human Anat & Physiology I	4			
BIO314 Human Anat & Physiol I Lab	0			
OR				
BIO317 Comp Vert Anat/Phys	4			
BIO318 Comp Vert Anat/Phys Lab	0			
Chemistry Elective	**4**			
CHM324 Organic Chemistry II	4			
CHM325 Organic Chemistry II Lab	0			

OR				
CHM440 Biochemistry	4			
CHM441 Biochemistry Lab	0			
Required Math	**5**			
MAT124 Calculus I	5			
Math Elective	**3-4**			
MAT214 Calculus II	4			
MAT304 Biological Statistics	3			
**Pre-Vet Preparation Concentration:				
Required	**21**			
BIO303 Microbiology	4			
BIO304 Microbiology Lab	0			
CHM324 Organic Chemistry II	4			
CHM325 Organic Chemistry II Lab	0			
CHM440 Biochemistry	4			
CHM441 Biochemistry Lab	0			
EQS306 Prct Equine Antmy & Cndtng	3			
EQS404 Vet Medicine & Reproduct	3			
EQU113 Equine Health & First Aid	3			
Equine elective	**3**			
EQR___ Applied Riding	1			
EQR___ Applied Riding	1			
EQR___ Applied Riding	1			
EQU221 Stable Management	3			
EQS328 Equine Evaluation	3			
Math Elective	**3-5**			
MAT124 Calculus I	5			
MAT304 Biological Statistics	3			

*Additional coursework in the humanities, psychology and/or sociology is recommended, especially writing intensive classes.

**Additional Coursework in the humanities is recommended

Required Upper Level Electives 11 Hours

Course	Credit	Semester Completed	Grade Earned	Substitutions
Any Upper Level BIO/CHM Electives:				
BIO___	3-4			
BIO___	4			
BIO___	4			
CHM___	3-4			

Cannot use a course for the upper level elective that has been applied to the Core, Field or Concentration and no more than 3 credits of internship can count toward upper level electives

Student:_____ Date:_____

Advisor:_____ Date:_____

Division Chair:_____ Date:_____

Substitutions to the coursework above requires the signature of the division chair.

Biology (BS) BS

Biology B.S. - 66 to 75 Credits (36 Core Credits and 30 to 39 Concentration Credits)

Pre-Med Preparation Concentration - William Woods University experiences 100 percent acceptance into advanced professional degrees in medical school, pharmacy and physical therapy doctoral programs. Our Pre-Medicine concentration prepares students with the additional pre-requisite coursework they will need for admission to and success in their medical field of choice, including calculus, anatomy and physiology, chemistry and others.

Additional coursework in the humanities, psychology and/or sociology is recommended, especially writing intensive classes. Pre-Nursing Preparation Concentration - Programs in the natural sciences provide preparation for students interested in pursuing careers in nursing and other health-related fields. Although admission requirements may vary from school to school and from on health-related field to another, there are three general requirements requested by most professional schools which enhance the strength of a student's application. Our Pre-Nursing concentration prepares students with the additional pre-requisite coursework they will need for admission to and success in their nursing field of choice. *Additional coursework in the humanities, psychology and/or sociology is recommended, especially writing intensive classes. Pre-Vet Preparation Concentration - Graduate schools for Veterinary Medicine are competitive, but William Woods University prepares its pre-veterinary students well. A popular program at William Woods University, we experience a high acceptance rate for students who have applied to colleges of veterinary medicine across the country.

The William Woods University Center for Equine Medicine houses a full time doctor of veterinary medicine, where students can participate in hands-on classroom work and where William Woods University's nearly 200 horses will receive health care, including routine care, diagnosis and treatment.

Additional coursework in the humanities is recommended.

Core Credits: 36.00

Course Code	Course Description	Credit Hours	Required / Elective
BIO 114	General Biology I -N	4.00	Required
BIO 115	Gen Bio I Lab	0.00	Required
BIO 116	Gen Bio I Lab for Transfer students	1.00	Required
BIO 124	General Biology II -N	4.00	Required
BIO 125	Gen Bio II Lab	0.00	Required
BIO 231	Genetics	4.00	Required
BIO 232	Genetics Lab	0.00	Required
BIO 401	Evolution	3.00	Required
BIO 450	Biology Practicum	1.00	Required
CHM 114	General Chemistry I -N	4.00	Required
CHM 115	General Chemistry I Lab	0.00	Required
CHM 116	General Chemistry I Lab transfer st	1.00	Required
CHM 124	General Chemistry II -N	4.00	Required
CHM 125	General Chemistry II Lab	0.00	Required
CHM 314	Organic Chemistry I	4.00	Required
CHM 315	Organic Chemistry I Lab	0.00	Required
CHM 316	Organic Chemistry I Lab for Transfer Students	1.00	Required
PHY 201	Physics I -N	4.00	Required
PHY 202	Physics I Lab	0.00	Required
PHY 203	Physics I Lab for transfer students	1.00	Required
PHY 212	Physics II -N	4.00	Required
PHY 213	Physics II Lab	0.00	Required

Concentrations

Pre-Med Preparation

Pre-Med Preparation Concentration - 30 Credits

*Additional Coursework in the humanities, psychology and/or sociology is recommended, especially writing intensive classes.

Core Credits: 30.00

Course Code	Course Description	Credit Hours	Required / Elective
MAT 124	Calculus I -M	5.00	Required
	Math Elective - must complete at least 3 credits		
MAT 214	Calculus II	4.00	Elective
MAT 304	Biological Statistics	3.00	Elective
	Biology Electives - 18 Credits (must complete at least 4 A&P and 4 Field Course Credits)		
	Biology Electives: Anatomy & Physiology Elective - 4 Credits		
BIO 313	Human Anatomy and Physiology I	4.00	Elective
BIO 314	Human Anatomy and Physiology I Lab	0.00	Elective
BIO 317	Comparative Vertebrate Anat/Phys	4.00	Elective
BIO 318	Comparative Vertebrt Anat/Phys La	0.00	Elective
	Biology Upper Level Electives		
BIO 300	Independent Study	3.00	Elective
BIO 303	Microbiology	4.00	Elective
BIO 304	Microbiology Lab	0.00	Elective
BIO 323	Human Anatomy and Physiology II	4.00	Elective
BIO 324	Human Anatomy and Physiology II Lab	0.00	Elective
BIO 330	Ecology	4.00	Elective
BIO 331	Ecology Lab	0.00	Elective
BIO 333	Vertebrate Zoology	4.00	Elective

BIO 334	Vertebrate Zoology Lab	0.00	Elective
BIO 340	Conservation Biology	3.00	Elective
BIO 343	Neuroscience	3.00	Elective
BIO 350	Animal Behavior	3.00	Elective
BIO 366	Interdisciplinary Honors Studies	3.00	Elective
BIO 390	BIO Internship I	3.00	Elective
BIO 400	Advanced Project	3.00	Elective
BIO 405	Cell & Molecular Biology	4.00	Elective
BIO 406	Cell & Molecular Biology Lab	0.00	Elective
BIO 414	Molecular Biotechnology	4.00	Elective
BIO 415	Molecular Biotechnology Lab	0.00	Elective
BIO 418	BIO Methods of Teaching	3.00	Elective
BIO 421	Biology Laboratory Assistant	1.00	Elective
BIO 430	Tropical Ecology	4.00	Elective
BIO 431	Tropical Ecology Lab	0.00	Elective
BIO 450	Biology Practicum	1.00	Elective
	Chemistry Elective - 4 Credits		
CHM 324	Organic Chemistry II	4.00	Elective
CHM 325	Organic Chemistry II Lab	0.00	Elective
CHM 440	Biochemistry	4.00	Elective
CHM 441	Biochemistry Lab	0.00	Elective
	Biology Electives: Field Course Elective - 4 Credits		
BIO 330	Ecology	4.00	Elective
BIO 331	Ecology Lab	0.00	Elective
BIO 333	Vertebrate Zoology	4.00	Elective
BIO 334	Vertebrate Zoology Lab	0.00	Elective
BIO 430	Tropical Ecology	4.00	Elective

BIO 431	Tropical Ecology Lab	0.00	Elective

Pre-Vet Preparation

Pre-Vet Preparation Concertation - 37 Credits

*Additional coursework in the humanities is recommended.

Core Credits: 37.00

Course Code	Course Description	Credit Hours	Required / Elective
BIO 303	Microbiology	4.00	Required
BIO 304	Microbiology Lab	0.00	Required
CHM 440	Biochemistry	4.00	Required
CHM 441	Biochemistry Lab	0.00	Required
EQS 376	Equine Anatomy and Physiology	3.00	Required
EQS 404	Veterinary Medicine & Reproduction	3.00	Required
EQU 117	Theory of Performance Hrs Hlth Mgmt	3.00	Required
EQU 118	Theory Prfrmnc Horse Hlth Mngmt II	3.00	Required
	Math Elective - must complete at least 3 credits		
MAT 124	Calculus I -M	5.00	Elective
MAT 304	Biological Statistics	3.00	Elective
	Biology Electives - 14 Credits (must complete at least 4 Field Course Credits)		
	Biology Upper Level Electives		
BIO 300	Independent Study	3.00	Elective
BIO 313	Human Anatomy and Physiology I	4.00	Elective
BIO 314	Human Anatomy and Physiology I Lab	0.00	Elective
BIO 317	Comparative Vertebrate Anat/Phys	4.00	Elective
BIO 318	Comparative Vertebrt Anat/Phys La	0.00	Elective
BIO 323	Human Anatomy and Physiology II	4.00	Elective

BIO 324	Human Anatomy and Physiology II Lab	0.00	Elective
BIO 330	Ecology	4.00	Elective
BIO 331	Ecology Lab	0.00	Elective
BIO 333	Vertebrate Zoology	4.00	Elective
BIO 334	Vertebrate Zoology Lab	0.00	Elective
BIO 340	Conservation Biology	3.00	Elective
BIO 343	Neuroscience	3.00	Elective
BIO 350	Animal Behavior	3.00	Elective
BIO 366	Interdisciplinary Honors Studies	3.00	Elective
BIO 390	BIO Internship I	3.00	Elective
BIO 400	Advanced Project	3.00	Elective
BIO 405	Cell & Molecular Biology	4.00	Elective
BIO 406	Cell & Molecular Biology Lab	0.00	Elective
BIO 414	Molecular Biotechnology	4.00	Elective
BIO 415	Molecular Biotechnology Lab	0.00	Elective
BIO 418	BIO Methods of Teaching	3.00	Elective
BIO 421	Biology Laboratory Assistant	1.00	Elective
BIO 430	Tropical Ecology	4.00	Elective
BIO 431	Tropical Ecology Lab	0.00	Elective
BIO 450	Biology Practicum	1.00	Elective
	Biology Electives: Field Course Elective - 4 Credits		
BIO 330	Ecology	4.00	Elective
BIO 331	Ecology Lab	0.00	Elective
BIO 333	Vertebrate Zoology	4.00	Elective
BIO 334	Vertebrate Zoology Lab	0.00	Elective
BIO 430	Tropical Ecology	4.00	Elective
BIO 431	Tropical Ecology Lab	0.00	Elective

Course Description
Upload program course descriptions from the most current Academic Catalog.

Biology B.S. – Course Descriptions

Required Courses:

BIO 114 – General Biology I 4.00

This course will introduce the broad underpinnings of biological science with a focus on the subcellular level. Students will be expected to describe fundamental molecular topics– such as water, DNA, and shape – and begin integrating them in the context of overarching principles such as scientific method, biological systems, and evolution. This course is geared toward science majors and pre-health professions students. Concurrent enrollment in BIO 115 required.

BIO 115 – General Biology I Lab

The purpose of this lab is to offer a hands-on investigative experience with some of the content addressed in BIO 114. Topics include measurement and microscopy, structure and function of the cell, the fundamental chemistry of life, photosynthesis, cellular respiration, Mendelian genetics, and an introduction to molecular biology.
Experimental design, use of scientific equipment, and critical thinking are emphasized, culminating in the execution and analysis of a student-designed experiment during the second half of the course. Concurrent enrollment in BIO 114 required. Prerequisite - Science ACT equal to or greater than 18 or BIO 105/106 with C or higher grade. (Lab fee)

BIO 116 – General Biology Lab for Transfer Students 1.00

Students conduct laboratory exercises selected to reinforce and augment the biology lecture course that students earned credit for at a previous institution. Experiments illustrate basic life principles and structures. Available only to students with posted transfer credit for BIO114 at time of enrollment. (Lab fee)

BIO 124 – General Biology II 4.00

A continuation of the introductory sequence in biology, emphasizing the diversity of life as illustrated by organisms in the five major divisions of life forms. Anatomical, morphological, and life cycle characteristics of the various phyla and classes are introduced, and evolutionary and functional relationships stressed. Concurrent enrollment in BIO 125 required. Prerequisite - BIO114/115

BIO 125 – General Biology II Lab

This laboratory primarily surveys the organisms of the major divisions of life forms, and visually demonstrates the changes in complexity of their form and structure as evolutionary processes have shaped organisms through geological time. Concurrent enrollment in BIO 124 required. Required Lab fee

BIO 231 – Genetics 4.00

This course will emphasize current developments and techniques in the study of inheritance including extensions and applications of transmission, population, and molecular genetics. Laboratory experiences will include Mendelian crosses of model organisms, computer simulations via software and Internet of traditional and population genetics, and an introduction to cell-molecular genetics techniques including micropipetting, sterile bacterial culture, and visualization and mapping of DNA via gel electrophoresis. Thought processes and problem solving will be emphasized. Concurrent enrollment in BIO 232 required. Prerequisites: BIO124/125 (*MAT 118 should be completed prior to or concurrent enrollment with BIO231/232)

BIO 232 – Genetics Lab

Laboratory experiences will include Mendelian crosses of model organisms, computer simulations via software and Internet of traditional and population genetics, and an introduction to molecular genetics techniques including micropipetting, sterile bacterial culture, and visualization and mapping of DNA via gel electrophoresis. Concurrent enrollment in BIO 231 required. Required Lab fee

BIO 401 – Evolution 3.00
Biologists widely regard evolution as the single unifying conceptual theme in a n extremely diverse and multi-leveled discipline. This course will attempt to integrate the thematic highlights of other courses in biology while integrating current developments and issues in evolution. Prerequisites - BIO231/232

BIO 450 – Senior Practicum 1.00
This portion of the Capstone experience will focus on preparation for the Senior Assessment and Senior Presentation, self-reflection on career choices and preparation for graduate program and/or career through resume writing and critique, analysis of the job market and consideration of the perceived match between career plans and academic and personal strengths. Prerequisite - BIO major and spring of Junior year standing

CHM 114 – General Chemistry I 4.00
A study of the fundamental principles and theories of chemistry with emphasis on stoichiometry and atomic theory and bonding. Must be taken concurrently with CHM115. Prerequisite -MAT099 or Math ACT/SAT of 22/520 or higher

CHM 115 – General Chemistry I Lab
Concurrent enrollment in CHM 114 required. Meets three hours per week. (Lab fee)

CHM 116 – General Chemistry Lab for Transfer Students 1.00
Includes laboratory exercises selected to reinforce and augment the chemistry lecture course that students earned credit for at a previous institution. Available only to students with posted transfer credit for CHM114 at time of enrollment. (Lab fee)

CHM 124 – General Chemistry II 4.00
A continuation of CHM 114 with emphasis on equilibrium, electrochemistry, kinetics, and thermodynamics. Prerequisites: CHM 114 and CHM 115

CHM 125 – General Chemistry II Lab

A laboratory study of principles of equilibrium and inorganic reactions directed toward the qualitative analysis of inorganic materials. Concurrent enrollment in CHM 124 required. (Lab fee). Prerequisites: CHM 114 and CHM 115

CHM 314 – Organic Chemistry I 4.00
A systematic study of the compounds of carbon with emphasis on the principles of synthesis, analysis, and reaction mechanisms of organic functional groups.
Prerequisites: CHM 124 and CHM 125

CHM 315 – Organic Chemistry I Lab

A study of the techniques of synthesis and analysis of organic compounds. Concurrent enrollment in CHM 314 required. (Lab fee)

CHM 316 – Organic Chemistry I Lab for Transfer Students 1.00
Students conduct laboratory exercises selected to reinforce and augment the chemistry lecture course that students earned credit for at a previous institution. Experiments illustrate fundamental organic chemistry lab techniques and demonstrate phenomena and theory described in lecture. Available only to students with posted transfer credit for CHM 314 at time of enrollment. (Lab fee)

PHY 201 – Physics I 4.00

An introductory physics course covering the topics of mechanics, thermodynamics, vibrations, and wave motion with an emphasis on critical thinking and problem solving. Computing software is used to provide interactive instruction and develop connections to the mathematical principals involved. Regular in-class demonstrations are performed and discussed in order to enhance conceptual understanding. Concurrent enrollment in PHY 202 required. (Lab Fee)

PHY 202 – Physics I Lab

The laboratory component of Physics I which reinforces and expands on concepts taught in the lecture. While conducting experiments, students will make observations about physical systems and collect numerical data. Emphasis is placed on identifying patterns and relationships in physical parameters. Students develop hypotheses in order to make predictions and verify presumptions. Formal lab reports are used to summarize relevant findings. Corequisite: PHY 201

PHY 203 – Physics I Lab for transfer Students 1.00

Includes laboratory exercises selected to reinforce and augment the physics lecture course that students earned credit for at a previous institution. Available only to students with posted transfer credit for PHY201 at time of enrollment.

PHY 212 – Physics II 4.00

A continuation of the introductory physics sequence which covers topics in electrostatics, magnetism, optics, and modern physics. Fundamental concepts from Physics I are described in greater complexity. Students are expected to apply their understanding of energy, mass, force, and inertia to more advanced problems involving atomic systems. Demonstrations and computational simulations are used to increase conceptual understanding. Concurrent enrollment in PHY 213. (Lab Fee) Prerequisite: PHY 201.

PHY 213 – Physics II Lab

The laboratory component of Physics II which reinforces and expands on concepts taught in the lecture. Group experiments are conducted in order to analyze the behavior of physical systems. Emphasis is placed on interpretation and inference as students are expected to use knowledge from the previous course to explain physical phenomena. Computational interface equipment and graphing software are used extensively. Students design and construct their own experiment on two occasions. Corequisite: PHY 212

-Required Biology Electives (for both concentrations)-

Biology Field Course Electives

BIO 330 – Ecology 4.00

This course examines the interaction of living organisms with each other and their environment. It presents a balanced introduction to ecology – plant, animal, theoretical and applied, physiological and behavioral and population and ecosystem. It combines the fields of natural history, forestry, agriculture, wildlife ecology and taxonomy. Concurrent enrollment in BIO 331 required. Prerequisites: BIO 124/125

BIO 331 – Ecology Lab

A field component will reinforce ecological concepts, enable discovery through the application of standard field techniques and employ the scientific method in the development of student reports on selected problems. Concurrent enrollment in BIO 330 required. Prerequisites: BIO 124/125. (Required Lab Fee).

BIO 333 – Vertebrate Zoology 4.00

Vertebrate Zoology is an introduction to the various vertebrate classes: the jawless vertebrates, primitive and bony fishes, amphibians, reptiles, birds, and mammals. Evolution of the classes as well as structural and functional differences among them will be emphasized. Both worldwide and local members of representative orders will be discussed in terms of habitat and specializations. Concurrent enrollment in BIO 334 required. Prerequisite - BIO 124/125.

BIO 334 – Vertebrate Zoology Lab

Concurrent enrollment in BIO 333 required. (Required Lab Fee).

BIO 430 – Tropical Ecology 4.00

This course examines the ecology of the tropics at multiple scales. It covers a wide range of important topics including large scale processes that contribute to shaping the abiotic profile of the tropics, plan physiognomy throughout the tropics, patterns driving species diversity, and species interactions.

BIO 431 – Tropical Ecology Lab
The lab is over Spring Break and is held in a tropical country. Each student will become an expert in selected taxonomic group and will have the chance to study, in depth, the richness, distribution, behavior (where applicable), and natural history of their group. The class will generally be at a bare minimum field station and entail long hard hours in hot and rainy conditions. (Course Fee).

-UPPER-LEVEL BIOLOGY ELECTIVES-

BIO 300 – Independent Study 3.00
Individually directed study on a topic not covered by regular course offerings. Requires permission of the instructor and the division chair. (Lab fee)

BIO 303 – Microbiology 4.00
This course serves as an introduction to the structure, physiology, pathogenicity, and ecology of microorganisms, particularly the bacteria and viruses. Concurrent enrollment in BIO 304 required. Prerequisites: BIO124/125 and CHM124/125

BIO 304 – Microbiology Lab
Laboratory work involves effective use of the microscope, staining procedures, handling of pure cultures, analysis of bacterial physiology, and identification of unknown bacteria. Concurrent enrollment in BIO 303 required. Lab Fee

BIO 323 – Human Anatomy and Physiology II 4.00

This course is a continued study of human biology from BIO 313. Students will investigate the structure and function of the endocrine, circulatory, immune, respiratory, digestive, urinary, and reproductive systems. The normal functions and integration of these systems will be explored in the context of their dysfunction through pathological case studies. This course takes a notably more cellular approach than BIO 313, and students will gain practice in assessing chemical physiological indicators and researching the associated primary clinical literature.
Concurrent enrollment in BIO 324 required. Prerequisites: BIO313/314

BIO 324 – Human Anatomy and physiology II Lab
This course is the laboratory extension of BIO 323. Students will gain practical experience in tissue sample preparation for histological examination. The organ system examined in BIO 323 will be observed via the dissection of preserved specimens; Students will also gain practice in modern clinical assessments of relevant physiological indicators and draw functional physiology conclusions based upon the analysis of pathology case studies. When possible, these systems will be studied via observation and dissection of cadaver specimens, therefore students should prepare for this possibility. Concurrent enrollment in BIO 323 required. Required Lab Fee Prerequisites: BIO313/314

Required Lab Fee. Prerequisites: BIO313/314

BIO 340 – Conservation Biology 3.00
The class will explore a wide range of important, and pertinent topics in Conservation Biology. It will begin by defining Conservation Biology and discuss the current threats to biodiversity. This class will discuss the need for global conservation, and through case studies and current examples, investigate the many different realms of Conservation Biology. This class is rooted in Biology, but no Conservation Biology is complete without conversations about policy, economics, sociology, and anthropology. Prerequisite: BIO124/125

BIO 343 – Neuroscience 3.00

This course is a study of the mammalian nervous system, with special emphasis on the human brain. This course covers the fundamentals of 1. The structure and function of the neuron, including action potentials, neurotransmitter, and the effects of hormones and drugs on the brain, 2. The organization and function of neural systems including basic neuroanatomy, the senses, and motor movement, and 3. Brain behavior interactions including learning and memory, attention, sleep, and emotions. Prerequisite: BIO231/232

BIO 350 – Animal Behavior 3.00

This course will focus on a broad range of topics within animal behavior. We will investigate both proximate and ultimate causes of animal behavior and study it across a wide range of taxa. We will discuss a diversity of topics from sexual selection and foraging to communication and aggression. An emphasis will be placed on the evolution of these different behaviors. Prerequisite: BIO124/125

BIO 366 – Interdisciplinary Honors Studies 3.00

The course allows students to focus on a narrow topic, examining it from two diverse academic disciplines. Topics will vary. (The course is open to honors program participants)

BIO 390 – Internship I 3.00

Course requires a minimum of 120 clock hours in an approved work situation. The student must submit a log documenting the work dates and times and describing the work activities according to at least three pre-approved objectives. In addition, the student will submit three essays describing and evaluating each of the following: the role of the on-site supervisor, the quality of the work environment, and the usefulness of extended internship activates. The student will also prepare a resume. Prerequisite: Requires permission of the instructor and the division chair.

BIO 400 – Advanced Projects 3.00

Special one-semester classes and seminars with varying subject matter designed for majors at the junior and senior level. The topic will be announced in the schedule of classes; topics will vary and may include such courses as Animal Behavior, Bioinformatics/Genomics, Immunology, Ornithology, or others. May be taken three times for biology major credit with change of topic.

BIO 405 – Cell & Molecular Biology 4.00

A study of the ultrastructure of the cell with an emphasis upon eukaryotes. Movement of materials into and within the cell, organelle structure and function, biochemical structure and function of DNA and proteins, and genetic reorganization will be discussed. Emphasis will be placed upon investigative procedures and problem solving. Concurrent enrollment in BIO406 required. Prerequisites - BIO231/232 and CHM124/125

BIO 406 – Cell & Molecular Biology Lab

Lab experiences include restriction digestion and ligation of plasmids, spectrophotometric analysis of DNA, preparation of competent cells, transformation, DNA amplification and fingerprinting, protein analysis, and tissue culture. Concurrent enrollment in BIO405 required. Required Lab fee

BIO 414 – Molecular Biotechnology 4.00

Biotechnology is the use of living systems and organisms to develop or make useful products. This course provides an introduction of biotechnology theories and techniques essential to laboratory research in agricultural, environmental, or medical biotechnology such as laboratory safety and records keeping, genome informatics, DNA analysis, RNA analysis, protein analysis and analysis of biological systems. The course provides fundamental knowledge in mathematics, chemistry, biology, and microbiology. Topics include: The fundamental chemical processes common in prokaryotic and eukaryotic biology; chemistry of biomolecules; cellular and molecular biology; gene expression and genetic engineering (tissue culture methods, microbiology techniques such as the purification and analysis, of nucleic acids and proteins, DNA manipulation and cloning procedures, protein identification methods); scientific information retrieval; and technical writing. The course will include the use of biotechnology in a variety of science fields including medicine and agriculture; however, an emphasis will be the biotechnology used in bioremediation, biomass utilization, and the production of bioenergy. Prerequisites: BIO231/232 and CHM314/315

BIO 415 – Molecular Biotechnology Lab

Biotechnology is the use of living systems and organisms to develop or make useful products. This course provides an introduction of biotechnology theories and techniques essential to laboratory research in agricultural, environmental, or medical biotechnology such as laboratory safety and records keeping, genome informatics, DNA analysis, RNA analysis,

protein analysis and analysis of biological systems. The course provides fundamental knowledge in mathematics, chemistry, biology, and microbiology. Topics include: The fundamental chemical processes common in prokaryotic and eukaryotic biology; chemistry of biomolecules; cellular and molecular biology; gene expression and genetic engineering (tissue culture methods, microbiology techniques such as the purification and analysis, of nucleic acids and proteins, DNA manipulation and cloning procedures, protein identification methods); scientific information retrieval; and technical writing. The course will include the use of biotechnology in a variety of science fields including medicine and agriculture; however, an emphasis will be the biotechnology used in bioremediation, biomass utilization, and the production of bioenergy. Prerequisites: BIO231/232 and CHM314/315

BIO 418 – Methods of Teaching 3.00

A theoretical and practical study of the teaching of science at the secondary level.

BIO 421 – Biology Laboratory Assistant 1.00

Students will work with biology faculty members to prepare for teaching labs and assist students during those lab periods. Junior of Senior Biology majors may elect this class upon invitation from the Biology faculty. These invitations are normally given after the spring Biology Assessment.

BIO 450 – Biology Practicum 1.00

This portion of the Capstone experience will focus on preparation for the Senior Assessment and Senior Presentation, self-reflection on career choices and preparation for graduate program and/or career through resume writing and critique, analysis of the job market and consideration of the perceived match between career plans and academic and personal strengths. Prerequisite - BIO major and spring of Junior year standing

Concentrations:

-Pre-Med Preparation-

Required:

MAT 124 – Calculus I 5.00

An introduction to the concepts of limits, continuity, differentiation of elementary functions, definite and indefinite integrals, and the Fundamental Theorem. Emphasis on use graphing calculators and the utility of mathematics as a problem-solving tool. Extensive discussion of applications in natural science, social science, and business. Prerequisite: MAT 118 or MAT 120

BIO 313 – Human Anatomy and Physiology I 4.00

Students in this course will explore human anatomy and physiology through the lens of modern scientific literature. Cellular physiology and the structure and function of the nervous, endocrine, musculoskeletal, cardiovascular, and special sensory systems will be addressed. Emphasis will be placed on learning the normal functions of these by accurately assessing pathologies in real clinical case scenarios. Students will synthesize their understanding of the integration of these systems through a composition in the style of a modern scientific review with concomitant seminar. Concurrent enrollment is BIO 314 required. Prerequisites - (BIO114/115 and CHM14/115) or HLT320

BIO 314 – Human Anatomy and Physiology Lab I

This course is the laboratory extension of BIO 313. Students will gain practical experience in tissue sample preparation for histological examination. The organ systems examined in BIO 313 will be observed via the dissection of preserved specimen. Students will also gain practice in modern clinical assessments of human organ systems by examining cases of their dysfunction/pathology. Concurrent enrollment in BIO 313 required. Required Lab Fee

-Pre-Med Chemistry Elective-

CHM 324 – Organic Chemistry II 4.00
A continuation of CHM 314. Prerequisites: CHM 314 and CHM 315

CHM 325 – Organic Chemistry II Lab

Concurrent enrollment in CHM 324 required. (Lab fee)

CHM 440 – Biochemistry 4.00

This course addresses the chemistry of living systems, including the structure and function of biological molecules and the mechanisms and products of their reactions. Emphasis will be placed on pathways of energy transfer and signaling, especially those that are deeply conserved among eukaryotes. The major classes of biomolecules will be examined with greatest focus on proteins. Student will actively research modern, primary biochemical literature and interpret it in the context of the principles and pathways discussed in class; furthermore, students will learn how to critique data and methods in the literature. Students will integrate prior knowledge and experiences from general and organic chemistry courses to arrive at a personal, and accurate, explanation of living systems through chemistry. Concurrent enrollment in CHM 441 required. Prerequisite - BIO124/125 and CHM314/315

CHM 441 – Biochemistry Lab
The laboratory extension of the CHM 440 course. Students will gain practical competencies in modern experimental biochemistry dealing with the major classes of biomolecules; emphasis will be placed upon protein. Additionally, substantial, independent immersion in primary literature research is a key feature of this course. Participants will design, execute, and analyze a relevant and novel biochemical experiment producing data that could potentially be published. Concurrent enrollment in CHM 440 required. Required lab fee.

-Pre-Med Math Elective-

MAT 214 – Calculus II 4.00
A continuation of MAT 124. Further techniques of differentiation and integration, the calculus of exponential, logarithmic, trigonometric, and probability distribution functions, as well as elementary differential equations. Requires extensive use of graphing calculators. Applications to biology, economics, and physics are studied throughout. Prerequisite: MAT 124

MAT 304 – Biological Statistics 3.00

A study of statistics intended for biology majors, focusing on practical applications of the use of statistics in research. Technology will be used to aid in computations. The student need not have had any prior statistics to enroll in the course. This course will not meet the Common Studies requirements for mathematics. Prerequisite: MAT 118 or MAT 124

-Pre-Vet Preparation-

Required Courses:

BIO 303 – Microbiology 4.00
This course serves as an introduction to the structure, physiology, pathogenicity, and ecology of microorganisms, particularly the bacteria and viruses. Concurrent enrollment in BIO 304 required. Prerequisites: BIO124/125 and CHM124/125

BIO 304 – Microbiology Lab

Laboratory work involves effective use of the microscope, staining procedures, handling of pure cultures, analysis of bacterial physiology, and identification of unknown bacteria. Concurrent enrollment in BIO 303 required. Lab Fee

CHM 440 – Biochemistry 4.00

This course addresses the chemistry of living systems, including the structure and function of biological molecules and the mechanisms and products of their reactions. Emphasis will be placed on pathways of energy transfer and signaling, especially those that are deeply conserved among eukaryotes. The major classes of biomolecules will be examined with greatest focus on proteins. Student will actively research modern, primary biochemical literature and interpret it in the context of the principles and pathways discussed in class; furthermore, students will learn how to critique data and methods in the literature. Students will integrate prior knowledge and experiences from general and organic chemistry courses to arrive at a personal, and accurate, explanation of living systems through chemistry. Concurrent enrollment in CHM 441 required. Prerequisite - BIO124/125 and CHM314/315

CHM 441 – Biochemistry Lab

The laboratory extension of the CHM 440 course. Students will gain practical competencies in modern experimental biochemistry dealing with the major classes of biomolecules; emphasis will be placed upon protein. Additionally, substantial, independent immersion in primary literature research is a key feature of this course. Participants will design, execute, and analyze a relevant and novel biochemical experiment producing data that could potentially be published. Concurrent enrollment in CHM 440 required. Required lab fee.

EQS 376 – Equine Anatomy and Physiology 3.00

This course is designed to develop an understanding of equine anatomy and physiology. Special attention will be given to the field of exercise physiology as it relates to the equine athlete. Students in this course will investigate the structure and function of the equine musculoskeletal, cardiovascular, respiratory, digestive, nervous, and endocrine systems. Equine specific adaptions will be emphasized throughout the course. Prerequisites: EQS306 or (EQU117, EQU118, BIO124/125 and CHM124/125)

EQS 404 – Veterinary Medicine and Reproduction 3.00

This course is an advanced study of equine veterinary topics. Open only to students with senior standing. Prerequisites: EQU 117, EQS 306 and Senior Standing. (Course Fee)

EQU 117 – Theory of Performance Horse Health Management 3.00

Students will explore management and treatment protocols for performance horses. Identification and administration methods and dosage for equine drugs and medications associated with the competition or working horse will also be addressed. Equine infectious diseases, injuries, illnesses, and complications are a primary focus of the course.

EQU 118 – Theory Performance Horse Health Management II – 3.00

Students will further explore more elements of practical management skills, the normal horse, health issues, lameness, drugs and medications and competitive drug rules. Prerequisite: EQU117

-Pre-Vet Math Elective-

MAT 124 – Calculus I 5.00

An introduction to the concepts of limits, continuity, differentiation of elementary functions, definite and indefinite integrals, and the Fundamental Theorem. Emphasis on use graphing calculators and the utility of mathematics as a problem-solving tool. Extensive discussion of applications in natural science, social science, and business. Prerequisite: MAT 118 or MAT 120

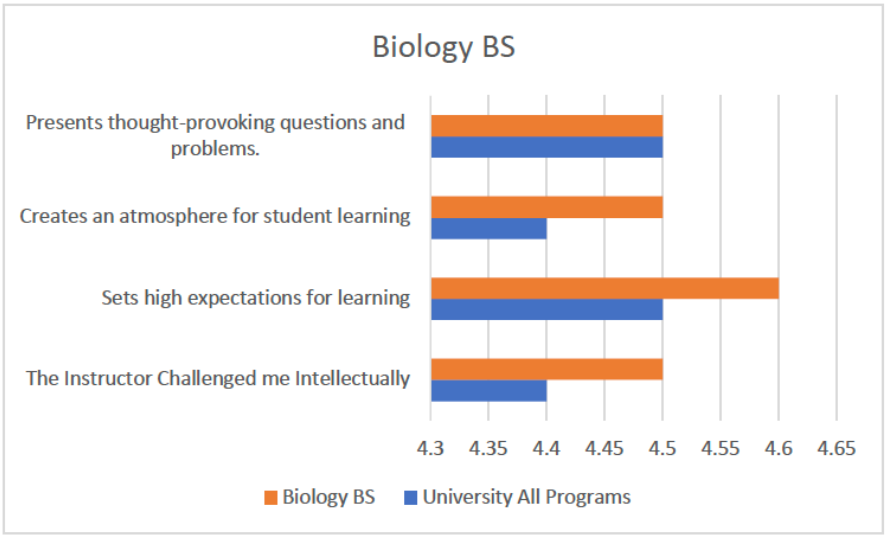
MAT 304 – Biological Statistics 3.00

A study of statistics intended for biology majors, focusing on practical applications of the use of statistics in research. Technology will be used to aid in computations. The student need not have had any prior statistics to enroll in the course. This course will not meet the Common Studies requirements for mathematics. Prerequisite: MAT 118 or MAT 124

Summary of Teaching Effectiveness
This data is compiled by the Office of Institutional Research and is comprised of End of Course evaluation responses of students. The data is comprised of the responses from Q8 "creates an atmosphere for student learning", Q16 "sets high expectations for learning, and Q22 "instructor challenges me intellectually".

Biology BS: Summary of Teaching Effectiveness

Course Evaluation Summary:



Sample:

N=1468 52.5% Response Rate

This data is representative of courses listed on the program checklist. Data from online courses represented in the program begin Academic year 2019-2020 after EOC alignment was created. This data represents end of course surveys from the 2017-2018 through 2019-2020 academic years.

Faculty Response to Teaching Effectiveness
How does this information impact faculty perceptions of classroom management and academic rigor? Will any changes be made resulting from this data? Are there other data available from Student Performance Review or alternative measures pertaining to academic success that can be used to discuss teaching effectiveness?

This shows that Biology faculty are doing a good job being at or above the University average in all categories. No changes will be made at this time as we are pleased with the rigor and learning shown by this data.
An additional piece of data that we are happy with is biology value added. We get this data from having our biology students take a standardized major field test in biology within the first few weeks of starting their first biology class and then again as they graduate. Students are significantly increasing their biology knowledge in their time here (see attached). Students have increased from having little knowledge coming in at the 27th and 11th percentile for 2019-20 and 2020-21 respectively and graduated with 60th and 48th percentile for 2019-20 and 2020-21 respectively. This

supports that independent of the preparedness students have come into our program, they are all leaving having gained substantial and appropriate knowledge in biology according to national standards.

Faculty & Resources

Physical Facilities

Physical Space/Resources

Describe the physical facilities that are unique to your program, including specialized buildings, classroom space, labs, and built in equipment and how they impact student learning. (If none, put N/A)

Most science courses, including biology, are conducted in the Cox Science & Language Center, henceforth referred to as the Science Building since language activities are not conducted there. The Science Building consists of two above-ground floors and a basement:

1. The top floor, erroneously denoted as the third floor in university documentation, contains space for faculty offices and normal classrooms; most biology and mathematics classes are held on this floor and most math & science faculty keep offices here.
2. The ground-level floor contains space for biology teaching and research laboratories and one biology faculty offices (Dr. Keller). The lab spaces are:
    1. **Room 209**, the most heavily used teaching laboratory because it is the largest. It can hold up to 30 students, however comfortably provides space for 20-24. This room contains a suite of teaching microscopes (three in disrepair), and small collections of preserved zoological and botanical specimens. A refrigerator and aging incubator and cryo-microtome (both gifted to WWU 20-40 years prior) are held here.
    2. **Room 201** is the next most used teaching laboratory, predominantly for anatomy & physiology coursework, but also for some other advanced courses. It contains a specialized ventilation unit for the clearing of fumes in that room only, a chest freezer (-20oC), another suite of teaching microscopes, several skeletons (two real), a small mammalian histological collection, and various equipment for the examination of anatomical structures and physiological parameters.
    3. **Room 202** is a genetics & cell biology laboratory containing three incubators (one for mammalian cell culture, the others for microbiological specimens), equipment for gel electrophoresis, a suite of micropipette controllers (for the handling of small volume liquids), and general consumable supplies. This room is not used as a formal teaching space, because it is too small to contain most of our classes and does not have a computer or A/V equipment (it's structure is not amenable to A/V presentation). Instead this room is used for ongoing student and faculty research projects. 202 is probably the most trafficked room in the building.
    4. **Room 204** is a preparatory lab containing fume and cell culture hoods, a chromatography refrigerator, a -80oC freezer, centrifuges, washing equipment (including deionized water source), and other consumable stocks. This is not a formal teaching space, however students and faculty use it for preparing materials and various projects.
    5. **Room 211** is a small research and preparatory space containing the most valuable equipment, which also cannot fit elsewhere, including a real time thermal cycler, several standard thermal cyclers, data collection apparatus for DNA and protein gels, a microbiological shaking incubator, a refrigerator, some consumables, two computers for data storage, and a DNA sequencer.
    6. **Room 200** is a computer lab for student use (16 stations). Individual class meetings for various math & science courses are occasionally held here when computers are needed.
3. The Science Building basement contains one classroom and two teaching labs, one each for chemistry and physics. These sciences are vital to a successful biology program, and classes in these areas are frequently filled or over-enrolled. Occasionally room 112 is used for biochemistry, which is taught by one of the biology faculty (Dr. Keller), when the handling of pure inorganic chemical reagents is necessary for teaching labs**.**
4. A small greenhouse exists in the parking lot northeast of the UIT building that is used by a biology student club and various interested staff members.

Upgrades to Physical Space/Resources

Changes/Upgrades that have been completed within the past 5 years, specifically for your program or are required because of your program along with any impacts to student learning.

There have been no major program-specific building improvements made in the past 5 years. However, we have received the following critical equipment (specific to biology), which has maintained and enhanced our science program offerings:

1. Replacement of a defunct -80oC freezer, which is necessary for the storage of reagents and specimens. Provided via WWU capital.
2. Addition of a portable chemi-luminescent blot scanner and data collection device. This has allowed us to bring our protein techniques into modern usage in several classes. Previously we were using technology dated to the 1980s for a technique (Western Blotting) that is fundamental to molecular biology. Purchased through capital improvement funds allocated by WWU.
3. Addition of a set of micropipette controllers, which allows more students to participate in day-to-day experiments in labs, though more are needed. Purchased through funds gifted by alumna Dr. Neff.
4. Addition of a new mammalian cell culture incubator, which has higher capacity for student and faculty projects, and saves money on gases. This incubator also provides tighter environmental control, which has enabled a new collaboration with EQS/Center for Equine Medicine, wherein we can cultivate equine bone marrow stem cells in vitro as well as culture pathogenic bacteria that require some carbon dioxide to survive. Purchased through funds gifted by alumna Dr. Neff.
5. Addition of various glassware, antique microscopes, and an oven gifted directly by alumna Dr. Neff from her late husband's laboratory in Nashville, TN.
6. Purchase of a new Gel Imager purchased with matching funds from the Cox Distinguished Professor funds and the Biology Department budget.
7. Several items currently being used in the department were donated to Dr. Kimberly L. Keller from her previous post-doctoral mentor upon her retirement. The items donated to Dr. Keller include, but are not limited to:

- a Coy Anaerobic Growth Chamber; an incubator for bacteria cultures; a Genesys UV-Vis Spectrophotometer; a deep volume water bath; a large volume microwave; Hungate Anaerobic Culture Tubes with stoppers and lids; various Pyrex media bottles; several micropipettes; various glass beakers and flasks; plastic pipette tips and Eppendorf tubes; and an assortment of chemical and media making components.

Recommendations to Improve Resources

Describe any desired changes/upgrades to facilities/resources and how the proposed changes would impact student learning.

In general with the growth of the biology program, low enrollment trend not withstanding, we suggest a larger discussion about expansion of facilities, faculty, and science offerings. It would also be desirable to see the offering of a chemistry degree – this would bring WWU in line with our major competitors, diversify and grow our enrollment in science programs, and enhance our recruitment of talented students to the university. Currently our chemist is at a maximum or higher overload every semester, and one of our biologists teaches a chemistry course (biochemistry). It is not uncommon to meet prospective students interested in a chemistry degree. Currently if students want to pursue advanced chemistry coursework they need to enroll elsewhere.

Though we recognize we just dropped the Physics program, it would be worth revisiting. Dr. Baldridge is a fantastic instructor, students really like him, and he would most likely have success building a major. Like with Chemistry, the problem is that it's hard to meet the various demands overseeing a major with only one faculty.

Another suggested area for potential faculty growth is in the plant sciences. In our annual assessments of learning we see that this is the most glaring gap in knowledge for our student body. Currently we are unable to offer any plant-specific courses due to lack of faculty load availability and expertise. Such an individual could also make greater use of the greenhouse facility.

The Science Building is also a small (in the context of science buildings) aging space that is not ADA accessible. Labs are at capacity or higher, and the building lacks comfortable study space that is conducive to greater student engagement. It is speculated that these issues affect recruitment and retention. There are numerous costly deferred maintenance issues well-known to the physical plant staff, and we commend their persistent efforts in keeping the Science Building operational. We also positively acknowledge the budget-wise guidance and support provided by the WWU administration in this context; science buildings are a considerable investment, but with the ever-increasing emphasis on STEM education and professions, science spaces are cornerstones of higher education institutions. Science is an outstanding investment considering the longitudinal societal impacts and the kinds of alumni these programs produce.

One thing that does need somewhat urgent attention is the bench taps in the COX labs. Specifically COX 209, but in COX 201 as well. These benchtops are severely aging and are no longer non-porous, thereby allowing chemicals and bacteria to diffuse into the surface which is a severe health hazard to our students.

Finally, and more specifically, we suggest the following capital equipment additions to the Biology program (see attached).

Technology Resources

List current technology specific for the program. What technology is used on a regular basis? Are there any technology needs for the program, issues with technology that impact the classroom? Is there technology that would benefit the teaching in the classroom that the program would like to investigate?

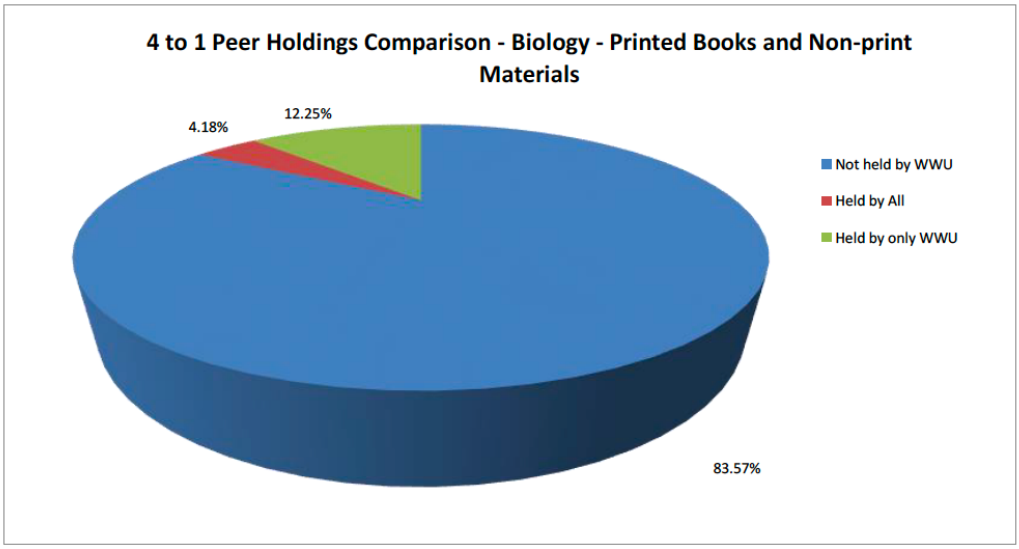
All of the classroom technology in COX is aging and in need of upgrades. There is only one smartboard, COX 104) and it is pixelated to the point where it is almost completed unusable. The projector in COX 301 no longer works, and the rest are faded and do not offer strong resolution. The zero clients could never play clear multimedia, and they have only gotten worse over time. Replacing some of the blackboards with white boards would be a good improvement as would a permanent white board in COX 301 and COX 300 that can be used while the projector is on.

Library Resources:

Insert the narrative from library staff pertaining to changes and recommendations to program specific library holdings.

III. Comparison with Peer Institutions (4 to 1 comparison)

Libraries Used for Comparison: Stephens College, Columbia College, Westminster College, Central Methodist University



IV. Analysis

Biology as a discipline taught at the undergraduate level generally requires up-to-date library materials. Both the print and non-print collections are fairly weak in all sub-disciplines of biology. However, instead of acquiring print materials in the biological sciences, the WWU Library has invested in digital materials, both monographic and serial. All resources are available through *Woods OneSearch.*

The Library currently does not have a database focused specifically on the biological sciences. However, the following databases are available:

Academic Search Ultimate - A collection of peer-reviewed, full-text journals, including many journals indexed in leading citation indexes. The combination of academic journals, magazines, periodicals, reports, books and videos meets the needs of scholars in virtually every discipline ranging from astronomy, anthropology, biomedicine, engineering, health, law and literacy to mathematics, pharmacology, women's studies, zoology and more.

Environment Complete - Offers deep coverage in applicable areas of agriculture, ecosystem ecology, energy, renewable energy sources, natural resources, marine & freshwater science, geography, pollution & waste management, environmental technology, environmental law, public policy, social impacts, urban planning, and more. The database contains full text for more than 680 journals, such as Environment (back to 1975), Ecologist, Conservation Biology, and more.

Primal Pictures: Anatomy.tv - Anatomy.tv from Primal Pictures is an interactive 3D human anatomy database built using real human scan data modeling all human structures, with the ability to rotate the model 360 degrees and add or remove layers of anatomy. Links include relevant text, dissections, clinical slides, diagrams, video clips and MRI scans.

PubMed - PubMed comprises more than 23 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.

Science Reference Center – A comprehensive research database that provides easy access to a multitude of full text science-oriented content. This database contains full text for nearly 640 science encyclopedias, reference books, periodicals, etc. Topics covered include: biology, chemistry, earth & space science, environmental science, health & medicine, history of science, life science, physics, science society, science as inquiry, scientists, technology and wildlife. The library staff acquires any resources that are not available in existing print and digital collections through interlibrary loan.

As in all other disciplines, WWU faculty and students have access to the resources available in MOBIUS member libraries, which includes the superb collections at the large research institutions in the state of Missouri, i.e., the four campuses of the University of Missouri, Washington University, Missouri State University and St. Louis University. Beginning in 2014, access to the resources of the academic, public and special libraries in Colorado and Wyoming became possible through Prospector, a resources sharing partner of MOBIUS. Prospector provides access to an additional 30 million books, journals, DVDs, CDs, videos and other materials, and includes the collections of the libraries at the campuses of the University of Colorado, Colorado State University, University of Denver, and the University of Wyoming. Resources selected from both MOBIUS and Prospector are delivered by courier, thereby reducing the delivery time.

Library Resources:

Faculty response to the adequacy of library resources provided to the program?

The library staff's analysis accurately reflects the extent of the biology-related materials available. While the print materials are relatively limited, the databases as well as the resources available via MOBIUS member libraries adequately meet the program's needs. Students and faculty rely on digital resources much more extensively than in the print materials.

Library Report

Attach the complete library report that is provided from thedirecotr of the Library that details the available resources to students in the program of study.

Biology_Library_Report_2020.pdf

Faculty and Staff Resources

Faculty

1-list all full time faculty in the program with highest degree, degree granting institution, years of full time teaching experience WWU, and contractual course load. 2-List adjuncts who have taught within the last 3 years with the same qualifying information and which courses they have taught.

Name of Faculty	Highest Degree Earned (Cognate)	Degree Granting Institution	Years Full-time Teaching in Higher Ed	Contracted Course Load
Robin S. Hirsch-Jacobson	Ph.D.	University of Missouri	10	9 (3-credit release for duties as director of the School of Science and Health
Kimberly L. Keller	Ph.D.	Bowling Green State University	9	12
Sarah Greenland-White	Ph.D.	University of California-Davis	4	12

Name of adjunct	Highest Degree Earned (Cognate)	Degree Granting Institution	Years Full-time Teaching in Higher Ed	Contracted Course Load
Glenn Gilyot	ABD	University of Missouri	0.5	6
Ryan Gettler	ABD	University of Missouri	0	3

Faculty Curriculum Vitae
Attach current Vitae for all full time Faculty
Kimberly_L_Keller_CV_October_2021.pdf
CVs_Sarah_Greenland_White_CV_2021.pdf
CVs_RHirsch_JacobsonCV2021.pdf

Adjunct Faculty Curriculum Vitae
Attach current Vitae for all adjunct faculty in the program.
CVs_Chemistry_Adjuncts_CHM_CV_s.pdf

How many staff are designated to support the program?

0.5

Staff
Do you feel the program is adequately staffed in order to meet the goals of the program?
Yes (selected)
No

Staff
Are issues with staffing impacting student learning?
Yes
No (selected)

Faculty Percentage of Courses Taught by Full-time vs. Part-time
Please include a chart of the number of classes taught within the program that are taught by full time and part time faculty. Please include academic years Fall 2013 through Spring 2018

Except for Chemistry labs, all courses in the BIO curriculum are taught by full time faculty.

Faculty Reflection on Teaching Load Distribution
Please discuss the distribution of courses between full time and part time faculty. What impact if any does this have on students and/or the curriculum?

All BIO classes, PHY classes, EQX classes, and CHM lectures are taught by Full time faculty. Nearly all CHM lab classes are as well, with a couple Gen Chem lab exceptions as mentioned above. This has a positive impact on our students as they get to know their faculty quite well, and trust that they are consistently getting quality instruction.

Recommendation on Personnel
What recommendations to personnel (Faculty/Staff) do the program faculty recommend? What is the rationale for the recommendation?

Right now, there is no recommendation for additional faculty. That said, Chemistry, Biology, and Physics faculty are consistently teaching overloads and there is very little room to grow at this point. Once enrollment rebounds we recommend the addition of two full time faculty: one full-time in Biology and another general science instructor.
A full-time faculty would allow us to diversify our classes (preferably someone with a plant background) and a general science position could teach 100 level lectures and labs across disciplines freeing up Dr. Moore and Dr. Baldrige for more advanced coursework. This would greatly boost our marketability as a science department.
Additionally, the biology faculty support developing a nursing program. We recognize that program is currently on indefinite hold but it could be a great recruitment tool, especially with the high national demand for nurses during the current pandemic.

Financial Analysis of the Program

Cost Per Major
This number is from the Academic Dean Report on Program Prioritization.

Financial Analysis by Program
Discuss issues and implications of the program budget. – need more description here to allow for a review of the financial cost of the program. I would like to add a prompt for programs to also report on their program cost per credit hour provided, in many cases this will look totally different to the cost per major, but still provides an alternate route to view the financial cost of a program.

The Biology department has an appropriate budget. It is not large enough to address some of the larger issues, but we are able to teach our classes and labs sufficiently with the budget.
The Chemistry budget is a little underfunded. It received a boost this year for restock and if that boost becomes permanent then the Chemistry program will also be adequately funded.

Instructional Expenses
Discussion of expenses related to instruction. i.e. Internship, clinical, practicums…

Instructional expenses are sufficient.

Non Instructional Expenses
Expenses that are included in the budget but not part of the instructional aspect of the program, not all programs have this.

NA

Assessment Planning

University Objectives
Use the Attached copy of the University Student Learning Outcomes and discuss the alignment of your program to these objectives. How do the courses in your program support and contribute to expanding students' knowledge.

The biology program at William Woods University is aligned with all four University Objectives.
Major Field Competence: Students will demonstrate excellence in an academic or professional discipline, and engage in the process of academic discovery.
Students are strongly encouraged to get shadowing hours and/or internships, as well as relevant professional jobs as well, during the school year, but primarily over the breaks. This is accomplished through formal and informal advising. The faculty all help with this process, as well as have classes specific to enable them to prepare for their future career (i.e. BIO 450). Identically, our emphasis on theory and practical problem solving promotes major field competence.

Ethics: Students will exhibit values and behaviors that address self- respect and respect for others that will enable success and participation in the larger society.
Much of our curriculum includes writing scientific papers, which has an ethical culture to itself. Students learn how to appropriately use other people's work, while giving them credit, and not plagiarizing. Additionally, we do lots of group-work in and outside of the labs and classes that ensure our students develop the skills to respectfully and successfully work with others. This process of exploration and research also serves to highlight the debt science has to the work and dedication of thousands of women and men over hundreds of years. An appreciation for how individual effort combines to create value for the world is a key component understanding how to ethically participate in society at large.

Self-Liberation: Students will develop an honest understanding and appreciation of themselves and others resulting in an ability to make individual decisions.
TThough we help students get and find internships, shadowing hours, and professional work, we emphasize that they must do much of the work themselves, knowing they have us as support. With the support from the faculty students can practice their interview skills, brush up on their technical competence, and evaluate the merits and drawbacks of varying life-options that they have while still maintaining a high degree of self-efficacy. This allows them to safely, and autonomously, make important career and life decisions, building their self-confidence and awareness that they can do it.

Lifelong Education: Students will possess an intellectual curiosity and desire for continual learning both within and beyond formal education in preparation for participation in a global society.
Our program has a strong push towards intellectual curiosity and continual learning that goes beyond information that should be learned for a test. From ethics discussions and having interesting speakers from a variety of biology backgrounds that our students are strongly encouraged to attend, to the self-designed experiments that are required in many of the biology courses (all biology students will have at least three major self-designed projects, many will have six) students have lots of opportunities to see how biology fits into the broader world. This preparation prepares our students to participate in the global society with an understanding that biology is relevant in today's world and impacts choices and policies. Furthermore, by experiencing a broad range of biological topics and researching topics for themselves, students will be better able to understand how they can find information out for themselves and will have the tools needed to pursue continual learning even after they graduate.
Institutional_Learning_Outcomes.docx

Program Outcomes

Identifier	Description
WWU2016.1	Major Field Competence: Students will demonstrate excellence in an academic or professional discipline, and engage in the process of academic discovery.

Additional Standards/Outcomes

Identifier	Description
BIO Pre-Med.5	Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.
BIO Pre-Vet.5	Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.
BIO.1	Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
BIO.2	Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.
BIO.3	Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
BIO.4	Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.

Program Assessment Matrix

Please insert a chart that shows the matrix for your program assessment plan/report.

Curriculum Map Biology BS Curriculum Map	A - Assessed		R - Reinforced		I - Introduced		M - Master										
	BIO 114	BIO 115	BIO 124	BIO 231	BIO 310	BIO 330	BIO 313	BIO 317	BIO 401	BIO 450	CHM 114	CHM 124	CHM 314	PHY 201	PHY 212	BIO 313	BIO 317	Student Performance Review
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	I	A	R, A	R	R	R	R	R	M, A							R	R	A
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	I, A	A	R	R	R	R	R	R	R		I	R	R	I	R	R	R	A
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems	I	A	R, A	R	R	R	R	R	M			R	R			R	R	A
BIO 2019.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	I	A	R	R, A	R	R	R	R	R							R	R	A

Pre-Med Concentration	CHM324	CHM 440	MAT 124	MAT 214	MAT 304	BIO 450	Student Performance Review
BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.	R	R	R	R	R	M, A	A
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.							
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	R	R	R	R		
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	R, M	M					
BIO 2019.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	R, M	M					

Pre-VetConcentration	BIO303	CHM324	CHM 440	MAT 124	MAT 304	EQU 111	EQU 117	EQU 118	EQS 306	EQS 376	EQS 404	BIO 450	Student Performance Review
BIO Pre-Vet.5 Construct a competitive candidacy for admission to veterinary medicine programs: integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.	R	R	R	R	R	I	I	I	R	R	M	M, A	A
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	R												
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	R	R	R	R				R	R			
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, theinterconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	R	R, M	M						R	R	R		
BIO 2019.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	R	R, M	M										

Assessment Descriptions:

BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.

Course	Assessment Measure	Criterion	Target Students
BIO 115	Direct - External Testing	Has the criterion Major Field Test - Section: III There is no score Benchmark = this test is given to our incoming Biology majors to determine the baseline for each student for the exam. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine "knowledge gained" from completion of the program. Benchmark = 100% of the declared Biology Majors will take the exam (those declared at the time of test administration).	Freshman
BIO 115	Direct - External Testing	Major Field Test - Section: IV There is no score Benchmark = this test is given to our incoming Biology majors to determine the baseline for each student for the exam. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine "knowledge gained" from completion of the program. Benchmark = 100% of the declared Biology Majors will take the exam (those declared at the time of test administration).	Freshman
BIO 401	Direct - Quiz/Exam	An assessment specific quiz (BIO401) will be used to ensure that assessment questions are direct and relevant to objective 1. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions	Seniors
Student	Direct - Proficiency Written Exam	a data analysis component. While we are happy with the choice to include this component in our SPD as	Sophomores/Juniors
Student Performance Review	Direct - External Testing	Major Field Test - Section: III Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 46 or higher.	Seniors
Student Performance Review	Direct - External Testing	Major Field Test - Section: IV Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher.	Seniors

BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.

BIO 114	Direct - Quiz/Exam	Questions from the First lecture Exam (BIO114) that were relevant to objective 2 were selected for	Freshman
BIO 115	Direct - External Testing	Biology Major Field Test - Section: I There is no score Benchmark = this test is given to our incoming Biology majors to determine the baseline for each student for the exam. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine "knowledge gained" from completion of the program. Benchmark = 100% of the declared Biology Majors will take the exam (those declared at the time of test administration).	Freshman
BIO 115	Direct - External Testing	Major Field Test - Section: II There is no score Benchmark = this test is given to our incoming Biology majors to determine the baseline for each student for the exam. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine "knowledge gained" from completion of the program. Benchmark = 100% of the declared Biology Majors will take the exam (those declared at the time of test administration).	Freshman
Student	Direct - External Testing	Major Field Test - Section: I Benchmark = Average score of 53 or higher on section, with 60% of students	Seniors
Student	Direct - External Testing	Major Field Test - Section: II Benchmark = Average score of 53 or higher on section, with 60% of students	Seniors

BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.			
BIO 115	Direct - External Testing	Major Field Test - Section: I There is no score Benchmark = this test is given to our incoming Biology majors to determine the baseline for each student for the exam. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine "knowledge gained" from completion of the program. Benchmark = 100% of the declared Biology Majors will take the exam (those declared at the time of test administration).	Freshman
BIO 115	Direct - External Testing	Major Field Test - Section: II There is no score Benchmark = this test is given to our incoming Biology majors to determine the baseline for each student for the exam. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine "knowledge gained" from completion of the program. Benchmark = 100% of the declared Biology Majors will take the exam (those declared at the time of test administration).	Freshman
BIO 115	Direct - External Testing	Major Field Test - Section: III There is no score Benchmark = this test is given to our incoming Biology majors to determine the baseline for each student for the exam. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine "knowledge gained" from completion of the program. Benchmark = 100% of the declared Biology Majors will take the exam (those declared at the time of test administration).	Freshman
BIO 124	Direct - Quiz/Exam	An assessment specific quiz (BIO124) will be used to ensure that assessment questions are direct and relevant to objective 3. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions.	Freshman
Student Performance Review	Direct - Proficiency Written Exam	a data analysis component. While we are happy with the choice to include this component in our SPD as this a skill our Biology Majors will need to have in a science career, it meant the assessment performed no longer meets this criterion.	Seniors
Student	Direct - External Testing	Major Field Test - Section: I Benchmark = Average score of 53 or higher on section, with 60% of students	Seniors
Student	Direct - External Testing	Major Field Test - Section: II Benchmark = Average score of 53 or higher on section, with 60% of students	Seniors
Student	Direct - External Testing	Major Field Test - Section: III Benchmark = Average score of 53 or higher on section, with 60% of students	Seniors

BIO 2019.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.			
BIO 115	Direct - External Testing	Major Field Test - Percentile Rank (This scores students in all 4 sections of the MFT) There is no score	Freshman
BIO 231	Direct - Quiz/Exam	An assessment specific quiz (BIO231) will be used to ensure that assessment questions are direct and	Sophomores
Student Performance Review	Direct - External Testing	Major Field Test - Percentile Rank (This scores students in all 4 sections of the MFT) Benchmark = 50% of students scoring in the 50th percentile or higher.	Seniors

BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.			
	Assessment Measure	**Criterion**	**Target Students**
BIO 450	Direct - Interview	75% or greater of the student interview responses will be satisfactory or better.	Juniors
BIO 450	Direct - Class Assignment	100% of students produce a professional CV or Resume	Juniors
Student Performance Review	Indirect - Survey of Students	60% of students actively participating in shadowing or other volunteer roles that will make them competitive for jobs in the medical and human healthcare related jobs and professional programs.	All Majors

BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.			
	Assessment Measure	**Criterion**	**Target Students**
BIO 450	Direct - Interview	75% or greater of the student interview responses will be satisfactory or better.	Juniors
BIO 450	Direct - Class Assignment	100% of students produce a professional CV or Resume	Juniors
Student Performance Review	Indirect - Survey of Students	60% of students actively participating in shadowing veterinarians and/or volunteering in other animal care avenues to make them competitive for applying to veterinarian schools.	All Majors

Assessment Data

Annual Assessment Report 2019-2020

Biology_BS__Annual_Assessment_2019_2020.pdf

Annual Assessment Report 2018-2019

biology_bs_annual_assessment_2018_2019.pdf

Annual Assessment Report 2017-2018

biology_bs_annual_assessment_2017_2018.pdf

Annual Assessment Report 2016-2017

biology_bs_annual_assessment_2016_2017.pdf

Annual Assessment Report 2015-2016

Biology_BS_Annual_Assessment_Report_2015_2016.pdf

Snapshot on Assessment (5-year)
Please refer back to the program Annual Assessment report and create a graph showing a 5-year trend on assessment data for your program objectives. This should show a quick view of how programs are meeting or not meeting set benchmarks from student assessment. Each objective should have its own graph in order to keep it organized and easy to track. Each graph should have a short narrative explaining what is happening with the data and what implications that has on the program and student learning.

See Attachment

Snapshot on Assessment
If the program already has a document with the charts created, then that document can be uploaded here for the purposes of this report.

Biology BS Assessment Snapshot

In this snapshot of the Assessment findings for the Biology BS Program, it is important to remember the number of students enrolled in the Biology BS have to declare a concentration of either PreMed or PreVet. As the number of students enrolled in the Biology is ~75% of our Biology majors, we have sufficient numbers of students in each concentration to truly look at if our majors are reaching our Assessment Benchmarks. When compared to the Biology BA program, the benchmarks associated with scores on the Biology Major Field Test (MFT) for the BS program were "Met" at a higher rate, which is due to the larger number of students in the BS Biology program and the extremely low number seniors each year. The data presented here is for four years, academic year 2016-2017 (AY16-17) through academic year 2019-2020 (AY19-20), because the program switched to new objectives for the 2016-2017 academic year. The objectives for the 2015-2016 academic year (AY15-16) were aligned to specific courses as many of the objectives and course descriptions were identical. When the program developed new Biology Objectives, we went from six objectives down to five objectives, and four were based on the AAAS Vision and Change in Undergraduate Biology Education initiative. Of the five objectives, four are associated with the core curriculum and one is used to assess the PreMed and PreVet concentrations. The new objectives were assessed over four of the five years of this program review are as follows:

- **BIO.1 Evolution:** Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
- **BIO.2 Interdisciplinary:** Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.
- **BIO.3 Diversity in structures, functions, and systems:** Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems
- **BIO 2019.4 Information and Energy:** Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.
- **BIO Pre-Med.5** Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.
- **BIO Pre-Vet.5** Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.

Objective 4 did not change in its content; however, a spelling error was corrected and is the reason for the "new" BIO 2019.4 Objective compared to the other three.

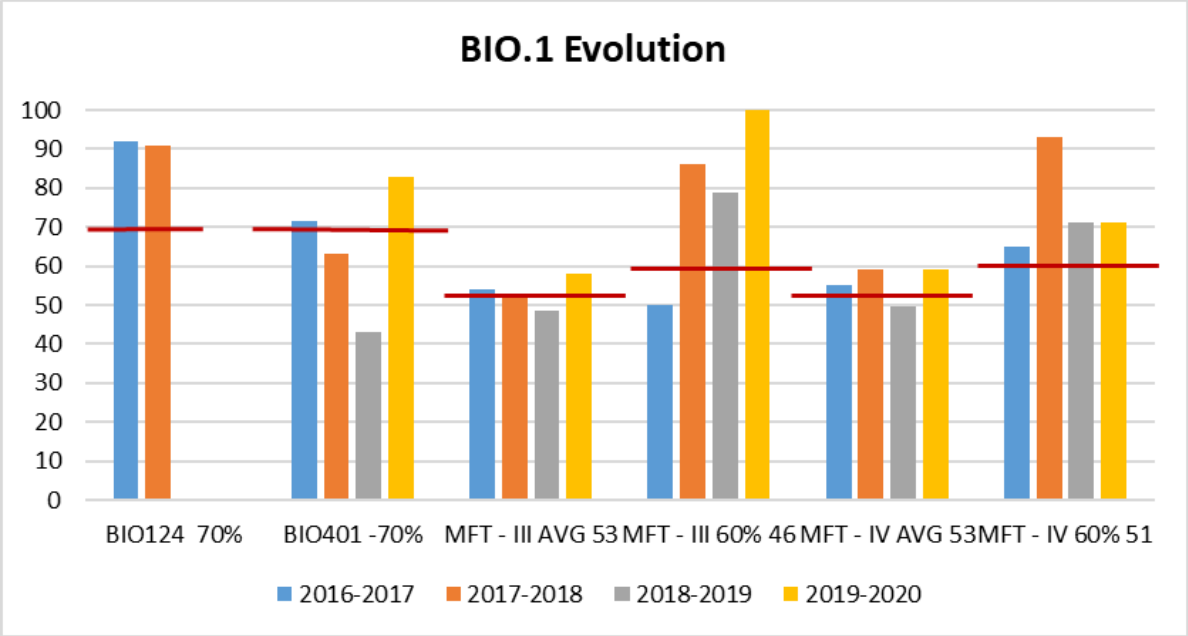
In order to assess the objectives, the Biology Department uses a combination of four of our core courses and the MFT. The ETS revised Biology MFT in 2019 and now that we have had a few years with this new exam, the Biology Faculty need to carefully review our benchmarks for each section and then determine if we need to change our benchmarks and/or change which sections are used for assessment for each objective. There are four sections, each with an individual score, as well as an overall Percentile Rank score. The four sections of the Biology MFT are: Section I - Cell Biology; Section II - Molecular Biology and Genetics; Section III - Organismal Biology, and Section IV – Population Biology, Evolution and Ecology. In addition to using these section scores and the percentile rank for assessment, in the Spring of 2017 we started giving the MFT to our incoming biology majors. We have no benchmarks associated with the MFT for these students, as is solely used

to determine their incoming baseline understanding of the material in order to use those scores to compare with their MFT scores they take the final spring semester of their senior year and determine “knowledge gained” from the Biology curriculum. After the spring of 2017, we started giving the MFT to our incoming majors within the first month of the fall semester. This provides a true baseline of the biology knowledge they have coming into the program and allows for an accurate determination of the knowledge they gained from the curriculum of the Biology BA Program at William Woods University.

The only change we would like to our assessment is to be able to write one Annual Assessment report for all three of our Biology Program. With larger cohorts of MFT data, we feel we could get a better assessment of the program as a whole instead of assessment of individual performances.

Four-year Snapshot of the Assessment:

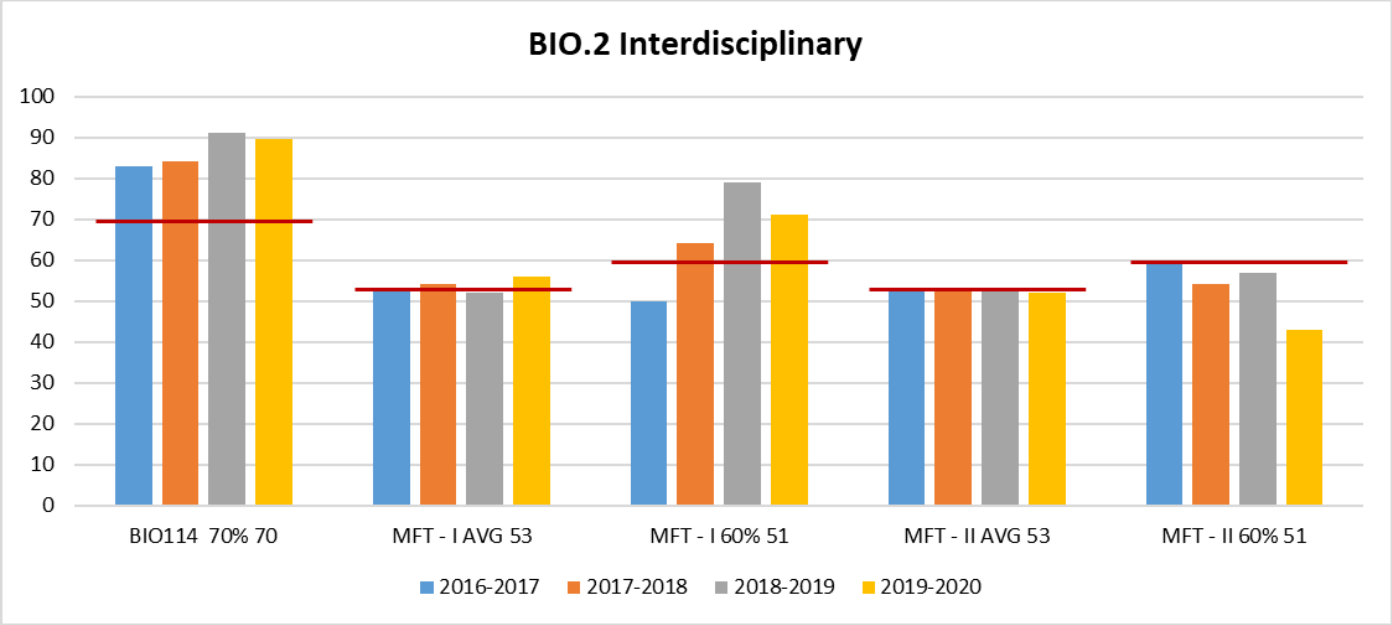
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.



During academic year 2016-2017 and 2017-2018, we assessed General Biology II (BIO124) in addition to our senor capstone course, Evolution (BIO401). After the AY17-18, the biology faculty decided it was best to only assess the Evolution objective in our Evolution course; and use BIO124 solely for assessing objective 3. For BIO401, Dr. Hirsch-Jacobson has used questions from either a quiz or the final exam, since the 19-20 academic, he has made a concerted effort to write questions which more accurately/directly assess the objective.

During the four years assessed with the new Biology Objectives, the benchmarks for the MFT consistently were "met" in 75% of the cases. Of the five "not met" that occurred, three of them were for the year 2018-2019, so it could be the performance by that senior cohort. Overall, the Biology faculty are pleased these assessments and benchmark and see no reason to change. It is important to remember the main difference in such a high percentage of "met" in the BS versus "not met" in the BA is the BS Biology cohort is much larger than that of the BA Program. With a larger cohort, our assessment numbers more of the benchmarks were "met" and a single bad score has less of an impact. This also provides strong evidence of writing a single Annual Program Assessment Report because the Biology Faculty see the three degree programs (BA, BS-PreMed, and BS-PreVet) as just a single "Biology Program" with three options of obtaining the degree.

BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.



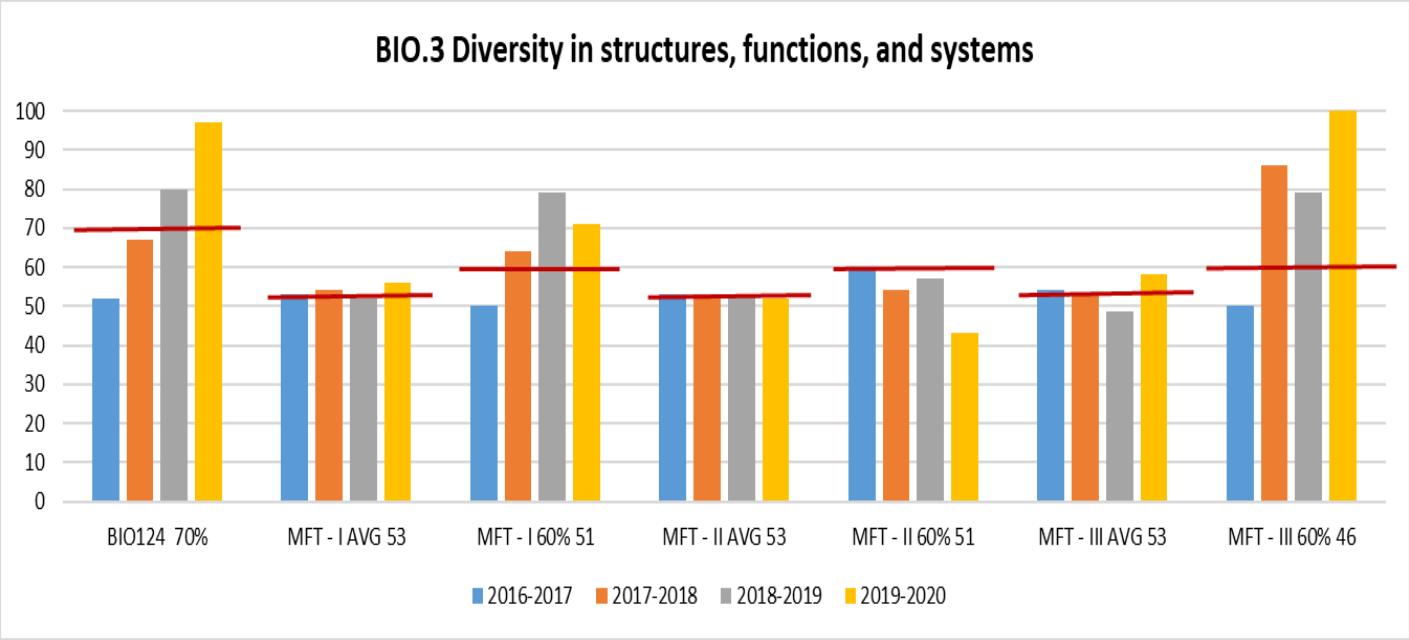
For Biology Objective 2, it is important to remember the Biology Department is very dependent on our Chemistry and Physics faculty interdisciplinary portion of our curriculum. Unfortunately, we have had a lot of turnover of faculty in both of those discipline areas.

However, since fall of 2016, we are on our fourth fulltime Chemistry faculty, and the program has had to rely heavily on adjuncts to teach both Organic Chemistry lecture/labs as well as General Chemistry labs. The Biology faculty our very happy about the addition of Dr. Ellen Moore as our Chemistry faculty (since fall of 2019) and the rigor and content she is bringing to this area. Students are definitely more knowledgeable about chemistry when discussed in our molecular based courses. In addition, Dr. Moore has worked hard to establish a collaboration with the Chemistry Graduate Program at the University of Missouri to get highly qualified individuals as adjuncts to teach the General Chemistry lab courses. In addition, we are on our third fulltime Physics faculty since fall of 2015. The Biology faculty our very happy about the addition of Dr. Sean Baldridge as our Physics faculty (since fall of 2017). As Chemistry through Organic Chemistry I and two semesters of Physics are required for BS Majors, these two faculty play a crucial role in the education of our Biology students.

For General Biology I (BIO124), Dr. Greenland White has specific exam questions she uses for assessment purposes and the result has been the benchmark consistently being “met.”

For the MFT, overall, we are pleased with the MFT results for this Objective. The MFT Section II benchmark of 60% of students scoring a 51 or higher was only “met one year, and “not met” the other 3 years. The Biology Faculty will keep a close on this benchmark and see if the stability of faculty helps increase our Biology BS students meeting this benchmark.

BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.

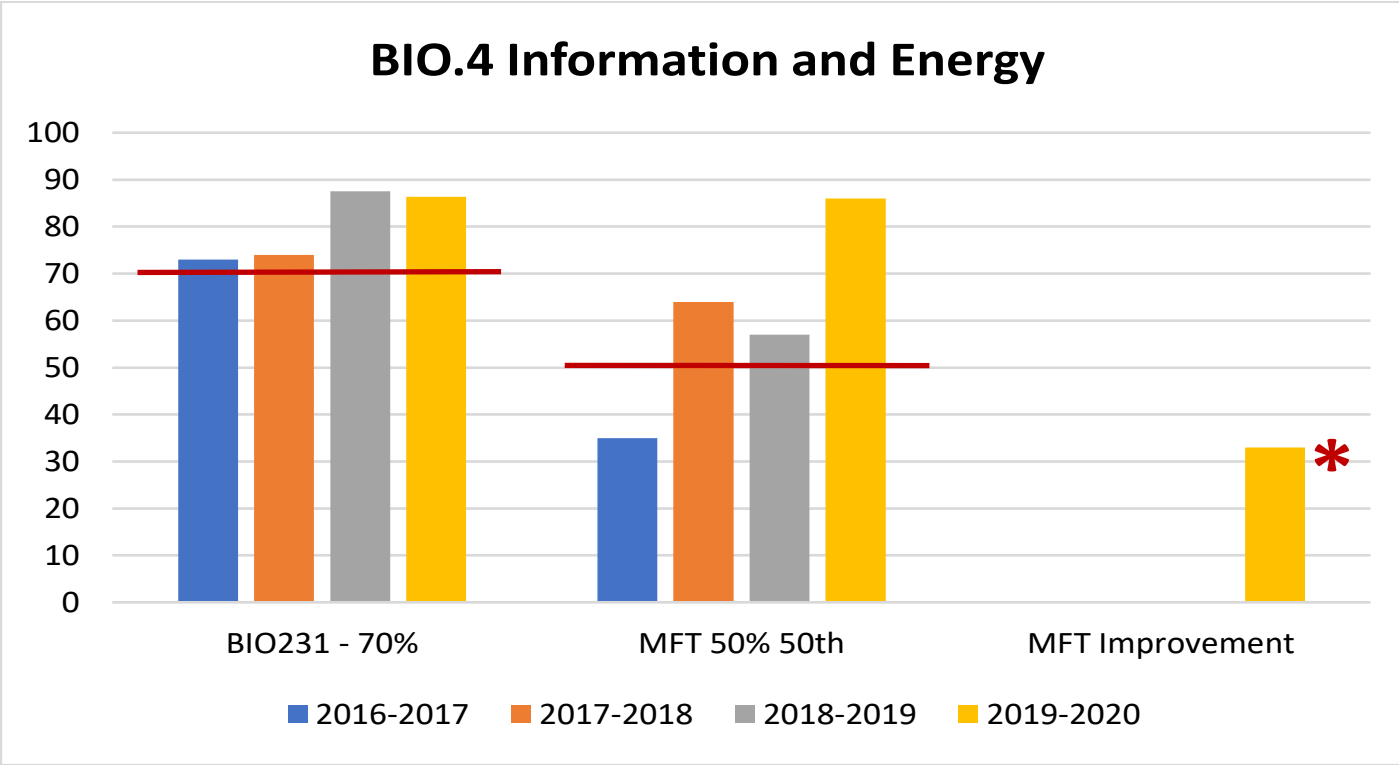


In Biology Objective 3, the Objective is looking at the diversity in structures, functions, and systems. As this Objective crosses many courses, we feel the students should be "meeting" the benchmark. For General Biology II (BIO124), Dr. Hirsch-Jacobson started writing specific quiz/exam question for assessment purposes and the result has been a steady increase in the benchmark being "met."

When looking at the MFT for this Objective, our benchmarks were "met" for 75% of the benchmarks set and half of those "not met" was again for the MFT Section II benchmark of 60% of students scoring a 51 or higher. The Biology Faculty will keep a close on this benchmark and see if the stability of faculty helps increase our Biology BS students meeting this benchmark and possibly consider different benchmarks for our different objectives.

Again, with a larger cohort, our assessment numbers more of the benchmarks were "met" and a single bad score has less of an impact. This also provides strong evidence of writing a single Annual Program Assessment Report because the Biology Faculty see the three degree programs (BA, BS-PreMed, and BS-PreVet) as just a single "Biology Program" with three options of obtaining the degree.

BIO 2019.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.



In Biology Objective 4, the objective is looking at "information and energy, and assesses our student's knowledge regarding the conservation of metabolic, signaling, heritable, and molecular processes across all life." The reason this Objective is BIO 2019.4 compared to the other three, is because there was a spelling error on the original one when entered into the AIS Assessment System. In 2019, we corrected the spelling error, resulting in the number 2019 date.

As heredity is a portion of this objective, the core course assessed is Genetics (BIO 231). This is the third course is our Biology Core entry level courses and has General Biology I and II (BIO114 & BIO124) as pre-requisites. Dr. Kimberly Keller has developed a quiz specific for assessment for this course given the last week of the semester. The benchmark for the course was "met" for all four years in this snapshot.

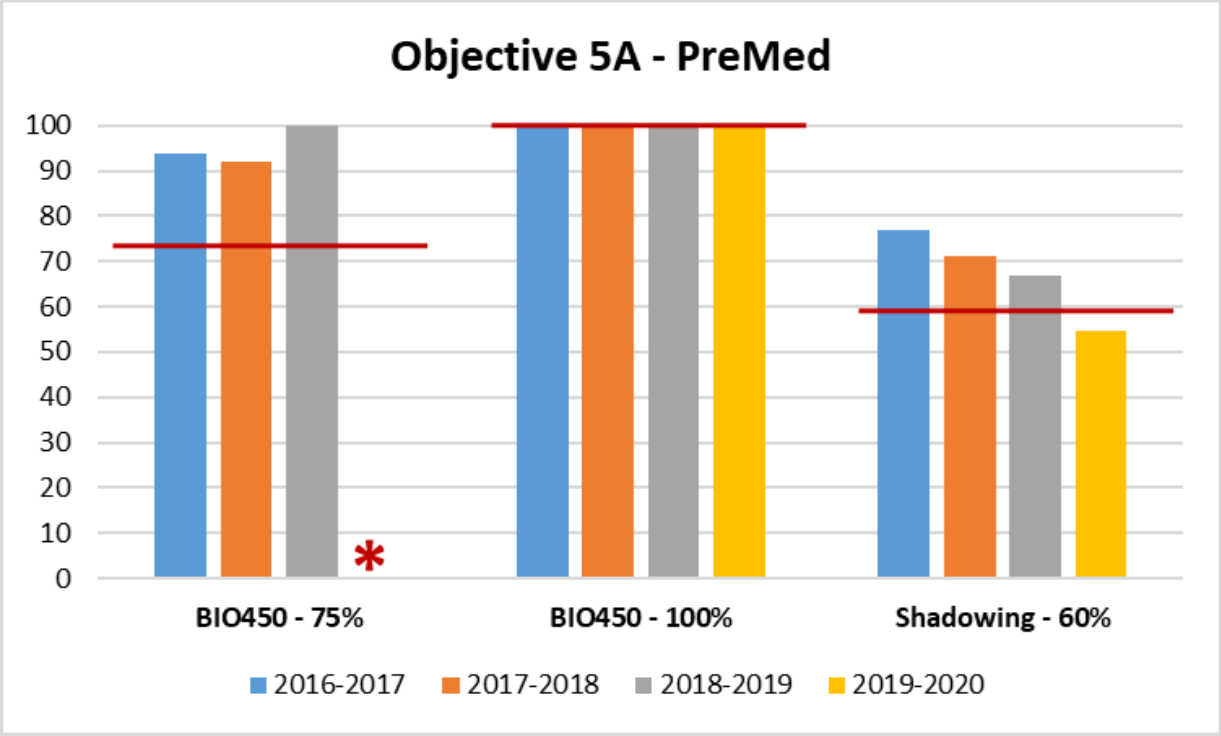
We use the overall percentile rank on the Biology MFT to assess this objective. For three of the four years the benchmark was "met." As the percentile rank reflects a student's overall score on the MFT, if a student does poorly on a particular section of the MFT but well on the other, there is still the possibility for the student to meet this benchmark.

While the scores and percentile rank on the MFT help give us insight into how our students are faring against those at other universities, looking at simply their senior scores does not consider how much an individual Biology major has progressed. The Biology faculty felt there was a better way to compare how much our biology students are learning from our curriculum as a whole and resulted from the observation that over the last four to five years we have seen a wider gap in grade distributions amongst the students in our courses. Prior to 2015, our biology courses generally had a bell-shaped curve when looking at the grades in any given course. That bell-curved began slowly becoming very disproportionate toward lower grades, and now the majority of our courses have a bi-modal distribution. In talking to other faculty on campus in other departments, this seemed to be a trend occurring at WWU. Due to our cohort numbers in the BS program being higher, as well as the cohort having a set of high performing students, the majority of the benchmarks for the BA were "Met" by

these students. However, we wondered if our curriculum was truly being affective in teaching what we belief is the core knowledge needed for a “Biologist.” By having students take the MFT as incoming majors and as outgoing Seniors, then by comparing those two sets of scores we could assess each individual student and determine the “knowledge they had gained” going through our program. The 2016-2017 academic year was the first time gave the MFT to our incoming/first-year Biology majors, and unfortunately, we gave the MFT during our spring performance days. The following year (AY2017-2018) we gave the MFT to our incoming majors within the first month of the fall semester and that is our standard protocol now. The only benchmark we have for those MFT scores is 100% of our declared majors at the time take the MFT exam, because the data is only used for comparison their senior year. The 2019-2020 academic year was the first time we had seniors taking the MFT in the spring who had also taken the test as a freshman. The comparison revealed our 2020 graduating Biology BS cohort showed an average gain of ~33 percentile rank points. While that first year it may not have truly assessed the knowledge gained since coming to the university since their first MFT score was after a semester and a half of biology and chemistry courses, it definitely showed an improvement in the comparison of scores. The following senior class (spring 2021) had an average “gain of knowledge” of 42 percentile rank We are proud of this data and feel while our students aren’t quite “meeting” the benchmarks we have set in individual sections of the MFT, students completing our Biology BS degree program are definitely leaving WWU with more Biology knowledge than when they arrived.

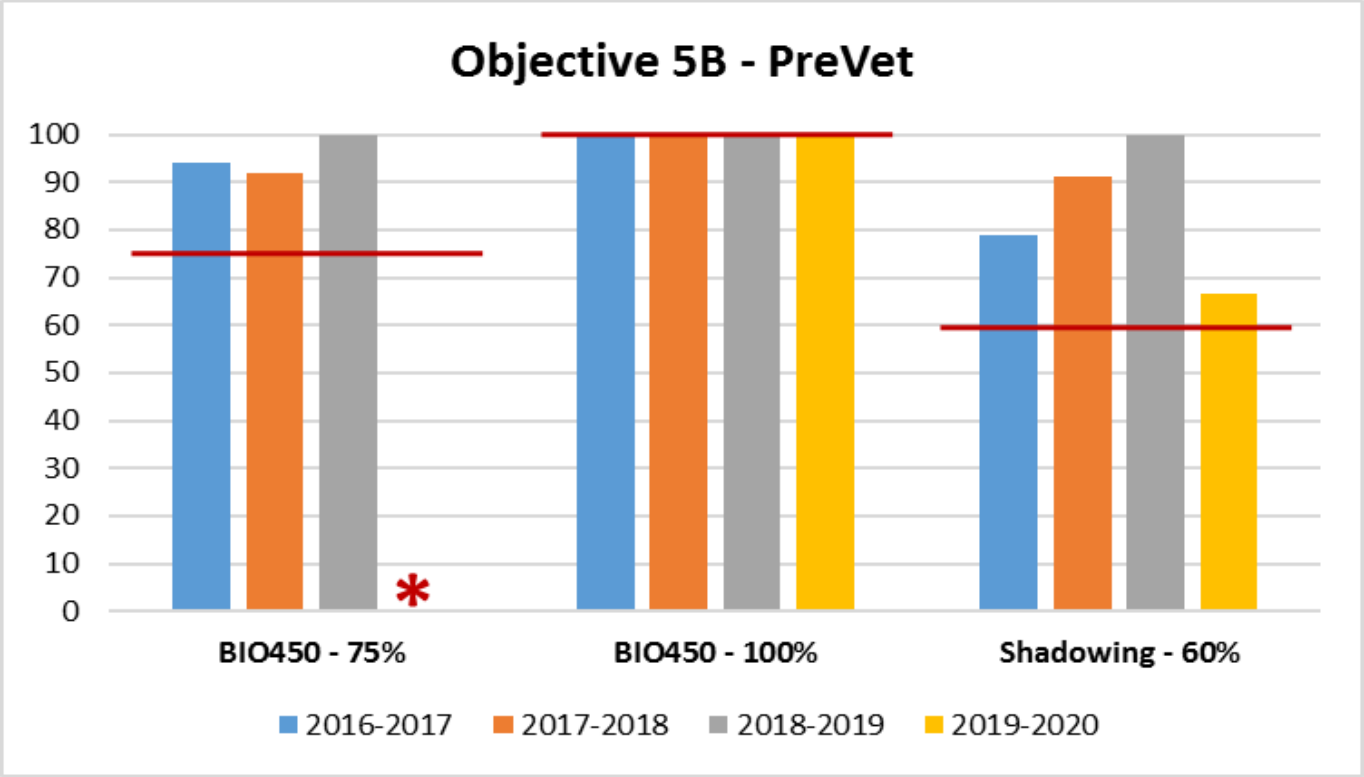
The Biology faculty truly feel moving forward, the “knowledge gain” is the best way to determine the success of the Biology Program. In addition, we feel writing a single Annual Program Assessment Report for all three of our degree programs (BA, BS-PreMed, and BS-PreVet) as just a single “Biology Program” with three options of how to obtain the Biology degree.

BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.



The "mock interviews" and the generation of a Resume/CV in Biology Practicum, continues to be "Met." The only course-associated benchmark that was "Not Met" was the Direct Interview that normally occurs as part of Biology Practicum (BIO401) in the Pre-Med concentration. *In response to COVID-19 pandemic, on March 16 all of our on-ground classes moved to an on-line modality. Unfortunately, because of the cause of switching modality in the middle of a semester, we cancelled our individual mock interviews with at least two of the faculty. As this assessment activity did not occur, the benchmark was "Not Met" when in reality it has "Not Performed." The shadowing data from the survey collected was "Met" by from Fall 2016 through Spring 2019, and was only "Not Met" in 2019-2020, as only 54.55% of our PreMed students had shadowing experiments. The Biology Faculty will look into and may develop some events by the faculty or by the Pre-Med/Pre-Health Professionals club to reinforce getting shadowing experience in the field they are pursuing.

BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.



The "mock interviews" and the generation of a Resume/CV in Biology Practicum, continues to be "Met." The only course-associated benchmark that was "Not Met" was the Direct Interview that normally occurs as part of Biology Practicum (BIO401) in the PreVet concentration. In response to COVID-19 pandemic, on March 16 all of our on-ground classes moved to an on-line modality. Unfortunately, because of the cause of switching modality in the middle of a semester, we cancelled our individual mock interviews with at least two of the faculty. As this assessment activity did not occur, the benchmark was "Not Met" when in reality it has "Not Performed."

We feel the shadowing benchmark was "Met" for all four years of assessment. In the Spring of 2020, 77.78% of students reported they shadowed the previous summer (2019) and 66.67% of the students reported shadowing during the academic year. While only 55.56% had secured shadowing for the upcoming summer (2020), as it was only mid-February and the other 44.44% were in the process of finding a shadowing experience, we feel it would be possible for them to "Meet" the benchmark. When we averaged the number of students who recorded shadowing experience either in the previous summer, the 2019-2020 academic year, and already had shadow arranged for the upcoming summer (2020) were averaged, 66.5% had reported shadowing experience – so we overall feel this benchmark was in fact "Met". We believe this is because shadowing experience is listed as a pre-requisite on Veterinary School websites.

Interview Question Assessment Tool

When we changed our Biology Objectives, the faculty modified the direct interview we had been doing for our "tweener" students, which are our 2nd-year and 3rd-year students, to include questions to assess Objective 1 and 3. As you can see from the table below, we have made several modifications to this assessment tool to try to get it to work the way we envision it would. As no two years of assessment for this was the same, we are unable to compare the results from year to year. The paragraphs below are the explanation of why this assessment tool changed so many times over these program review years.

	OBJ 1	OBJ 3	Improvement Narratives
2015-2016	**Old Objectives – This Assessment Not Performed**	**Old Objectives – This Assessment Not Performed**	**Old Objectives – This Assessment Not Performed**
2016-2017	Students are asked a question regarding some aspect of Evolution in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: Average score for all students in the major 3/5 or higher.	Students are asked a question regarding some aspect of Molecular structure in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: Average score for all students in the major 3/5 or higher	
2017-2018	Students are asked a question regarding some aspect of Evolution in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: Average score for all students in the major 3/5 or higher	Students are asked a question regarding some aspect of Molecular structure in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: Average score for all students in the major 3/5 or higher	**Refine Assessment Tool:** Move this from a Direct Interview format to a more Direct Formal Exam based assessment using VIA
2018-2019	Students are asked a question regarding some aspect of Evolution in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: 70% of students scoring 3/5 or higher on interview questions	Students are asked a question regarding some aspect of Molecular structure in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: 70% of students scoring 3/5 or higher on interview questions	**Refine Assessment Tool:** Write better assessment question, put a two paragraph or minimum word count on the questions to try to get our students to write more, thorough answers to the question
2019-2020	Students are asked a question regarding some aspect of Evolution in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: 70% of students scoring 3/5 or higher on interview questions	Students are asked a question regarding some aspect of Molecular structure in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: 70% of students scoring 3/5 or higher on interview questions	Revise Assignment for Assessment: Remove this criterion from further Assessment Reports

When we started with this new format, we allowed the students to see the questions for 10-15 minutes prior to the interview to formulate answers, and then they had a ten-minute interview with Biology Faculty where they answered the two questions. Many students struggled with this format, and we were unable to assess whether it was due to them struggling to answer the questions or them struggling because they felt very nervous answering questions in front of all the biology faculty. We modified the assessment tool to let the students not only see the questions, but we allowed them more time before the interview (20 – 30 minutes) to write out their answer and make themselves notes to see if their interview answers would improve. Unfortunately, not much changed and

we were still disappointed by the overall performance of our biology majors. Therefore, we tried yet another modification. We went to two direct "exam essay" questions in which they had 30 minutes to complete using our "VIA" assessment software. That did not seem to help either, as many of our top students. We modified the instructions to paragraph and/or word minimum limit, but we still were unhappy with this assessment. We ultimately decided to remove this assessment because there were too many factors at play to get a good assessment. One being, we did this during our Student Performance Review Days and so the courses our 2nd-year majors had completed compared to those our 3rd-year majors had been vastly different and could affect their ability to answer. In addition, we had such a variety of answers in the student answers that we soon realized the wording of the question was very important in getting students to "think" down the road we wanted. In the spring of 2020, we removed this from our assessment map of Objectives 1 and 3 and went to a career skill our students were lacking, reading, and analyzing a peer-reviewed article. In groups, students had to pick from one of several "pre-selected" journal articles. Students were then given time to read and discuss the article and then gave a short presentation. While we quickly learned there were several aspects of this assessment tool that we needed to change, we definitely knew it was a valuable skill assessment activity for our students. The biology faculty have continued to make minor adjustments over the past couple of years and feel we now have an assessment tool we are pleased to use.

BIO115 MFT Assessment:

The MFT given in BIO115 (General Biology I Laboratory) does not have a benchmark for scores on any of the sections or the exam as a whole "percentile rank" score. The only benchmark is 100% of declared majors take the MFT, and we have been fortunate Dr. Greenland-White get our majors to declare and makes accommodations to get them all to take it.

Analysis on Assessment

What is the assessment process for the program overall? What general activities are used to collect assessment information? Are all faculty involved in the assessment process?

For our Assessment of the Biology BS Program, we use our three core course series (BIO114/115, BIO124/125, BIO231/232) to do an initial assessment for three of the four Biology Program Objectives. Each of the initial core courses are taught by a different full-time Biology Faculty member. For Objective 1, we assess our Biology Majors in our capstone course, BIO401 (Evolution) (see table below).These course assessments are generally a quiz or a set of questions on an exam that are specific to that Biology Objective.

Course	Objective Assessed	Faculty
BIO114/115 General Biology I	2	Dr. Sarah Greenland White
BIO124/125 General Biology II	3	Dr. Robin Hirsch-Jacobson
BIO231/232 Genetics	4	Dr. Kimberly L. Keller
BIO401 Evolution	1	Dr. Robin Hirsch-Jacobson

External Review

External Review for Program Evaluation

Your role as an outside reviewer is to verify the information provided by the on-campus program review team. Your evaluation helps identify the program's strengths and recommend ways to address areas of concern. The following guide is intended to facilitate your work as a reviewer. The questions provide a quality rating of

Exemplary, Adequate, Needs Improvement, Not Evidenced. Please provide a justification for your rating in the section below the question. Use as much space as necessary for your response.

At the conclusion of the evaluation, please provide a summary that addresses overall aspects of the program.

1.1 History of the program is succinct, but detailed. (-300 words)
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Exemplary.
The summary offers a succinct yet colorful history of why the program is where it is now. Further, it outlines the severe issues in lack of personnel and lack of infrastructure that have caused a severe bottleneck in programmatic growth. At this point, the University must really choose its level of support with the sciences, as there are no longer bandaid-type approaches that will be suitable for further growth. Not to mention, the stress of the load on the current faculty may become too great if continued for any amount of time. I would only add, if possible, to this history, a short sentence of student numbers in the BS program in the recent years, as they have grown since the current faculty have been in place.

1.2 Program's purpose/mission is clear, including relationship to the university's mission statement.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced. Then please justify your rating in the below section.

Exemplary.
The summary substantiates the claims; however, there are a few descriptions that are a bit ambiguous and may cause trouble if the program gets larger without similar changes in faculty size. For example, the summary claims programs are conducted through small group and one-on-one interactions with expert scientific scholar-practitioners. This certainly may limit the class-size and adjunct usage (though I know this is already limited). Due to the fact that William Woods prides itself on being a “small liberal arts” school, special thought will need to go into programmatic expansion, when necessary to keep the cultural “feelings” similar.

1.3 Clearly describes the approach to maintain or improve student retention and graduation rates.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced. Then please justify your rating in the below section.

Needs Improvement.
The causative agents of why enrollment did decrease are well explained in the narrative in this section and data are clear regarding the fact that (hopefully) several of the issues that were impacting the B.S. Biology degree have been mitigated. However, it is not clear in this report what the program’s plan is to maintain or improve retention and graduation rates. A PowerPoint “BIO 4-year Planning Presentation” is attached to the document that looks to be used with incoming Freshman in order to best choose their major, concentration, and class pathway. However, how this would be used best for enrollment, or how this has been shown to increase enrollment, etc. is not discussed. I certainly believe that a more robust plan, working with the office of recruitment/retention, would benefit this area greatly. Further, I think it is important not to lay too much more of this burden on the Biology faculty themselves unless other duties are relieved from them.
Sidenote: I have a Student Demographics section located in their report here. I didn’t get a chance to ask about this while I was there. The discussion is based primarily on the discrepancy caused by the pre-nursing issue, which I was able to get clarity on while I was there. The causative issues are clear and I did not see a reason to worry about that section and moved on with the questions here. However, the answers to these questions do not seem apparent, so some manual manipulation may be in order to make the answers more specific. My judgement of the answers is reflected, in part, because of this.

1.4 Program has clearly defined strategies for retention and graduation rates of students.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced. Then please justify

your rating in the below section.

Not evidenced.
For the same reasons as stated in the approach to enrollment and retention, there is no evidence of a strategy for retention and graduation. Verbally when I came to talk with the students and faculty, most of the students stated that they were very satisfied with their recruitment from the University Recruitment office. Further, the faculty did say to me that they stay in touch with the office of recruitment. Another point of discussion from the faculty was the idea that some students may be better-suited for the B.A. and that initial recruitment or transfer to this degree may assist in retention/graduation. However, this was not evidenced in the written report.

1.5 Program advising loads are appropriately delegated throughout the program.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced. Then please justify your rating in the below section.

Adequate.
The goal of having approximately no more than 20 advisees per advisor seems reasonable for a university of this size. Further, this type of intensive individual advising fits the mission and vision of the university and program. It is, however, always difficult to establish the appropriate number of advisees when the national average is somewhere around 280-350 per advisor and some community colleges can be as high as 1000 advisees per advisor. Obviously, no one would argue that these numbers are far too large for a university of William Woods' goals and make-up. However, it does bring into question what are the specific goals of advising and what are the criteria by which we best meet those goals? Where does the magical number of 20 come from? I feel that this should be further analyzed and will elaborate this more in the next question.

1.6 Program has clearly articulated advising processes followed by all faculty within the program.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced. Then please justify your rating in the below section.

Adequate.
This reviewer feels that the document placed previously in the enrollment plan "4-Year Planning Presentation" should be placed here, as it is appropriately explained and referenced here as a tool for advising. In the program review it is stated that the yearly student retreat is quite successful at helping students to plan their courses both in their 4-year pathways, but also to tweak their plans later on as things change. Further, more experienced students help newer students with these decisions and are part of the advising process. This is an excellent idea.
When I met with students on my visit, students overwhelmingly stated that professors made themselves available to open-door visits. Professors made themselves available for questions, regardless if the questions were about class, advising, or life. This reviewer believes that this type of availability is difficult to capture and calculate, but is absolutely invaluable to a program like William Woods' is promoting. This is how a program becomes personal and why many of the students I talked to - even those that had lost their original majors – had chosen to stay at William Woods anyway (possibly to the detriment of their studies) because they loved the learning environment and believed they would not find that anywhere else. This is a testimony to the community that is being built in the Biology program.
Thus, I question how to come up with the adequate number of advisees per advisor. Not because I do not believe that the faculty are doing a lot of work, but because I do believe that community is being built, and I wonder if some of the advising can be pushed more heavily onto this fall retreat and maybe some senior "ambassadors" and free up the faculty for some other duties. This really is a theoretically wild question that I thought about after meeting with everyone and would need to be assessed by all involved. I would highly recommend looking into some of the resources put out by NACADA and possibly doing a self-study using the CAS standards to try to better understand and assess what type of needs advisement is filling in your program and exactly how much time faculty will need to expend to fill those needs.

1.7 Comprehensive accounting of graduates in internship placements.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Not Evidenced.

It is stated that there is no required or formal internship as part of the curriculum. However, it is noted that faculty encourage students to seek internships and help them find internships, especially during the summer. This seems like a lost opportunity for several reasons. First, faculty are expending time and energy helping students into experiences that they are not being recognized for. Second, students, either directly or indirectly representing the William Woods Biology Department, are making connections with community (although it may be distant community) leaders for a period of time and these connections are not being recognized or utilized. Last, because these internships are not documented, they are only as good as the faculty and students that know about them.
Turnover of the faculty that have cultivated these relationships or the students that have utilized them could cause an immediate termination of important links with opportunities. With the world as we know it becoming more tumultuous, community connection for our students to utilize, even if not a required portion of the program, is an important feature. Further, known opportunities for students could be featured in recruitment materials and could become potential elective courses linked to research or thesis study. I feel that this is untapped potential that faculty are virtually doing work for no recognition. This should certainly be an area of consideration.
I also am very confused because BIO 390 is a course on the program books that is literally called “Internship I” and is described as requiring a log submission of documentation of work dates and activities, essays regarding the work environment and usefulness of the internship, and a resume based on the work. Doesn’t this literally fall into the documentation needed for this area? Maybe I am missing something, but I would think this could be adapted to some of the things discussed in my previous paragraph.
Further, there is a lot of talk about internships, shadowing, and other things in their senior exit interviews. I am confused how these terms are used and will explain this later on. I think that definitions of these terms need to be strictly adhered to so as not to confuse the reader or assessment groups regarding what type of experience the student is partaking in and if this experience is a formal or informal event and an assessed or non-assessed event.

1.8 Provides detailed description of possible employment positions for graduated students.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
This reviewer agrees that “in the field” is broad and subjective in science. Is there any variation in success between the two concentrations? This analysis would probably require several years of data to be able to pick up, but would be interesting to consider. Further, is one concentration more “local” geographically than the other in terms of their success? This would probably be beyond the scope of your program to investigate, but might be something to team up with your recruitment office to look at.

1.9 Post-Graduation data is complete and provides a picture of where students go after graduation.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Needs Improvement.
It is noted that all of the faculty are currently running on overload, we are currently in a pandemic and have been for a couple of years now, and faculty can only do so much. That being said, this is an area that needs some attention, and being from a small university myself and having reviewed other small universities, this tends to be an area we all too often let slip. The “BS Graduate and Employment Data Chart” seems to have a numerical error in it. I assume that the “in field” numbers are included with the “professional school” numbers to make the “graduated students (total)” numbers match. However, this does not work for every year, so there seems to be an error in accounting. Further, the 10 unknown from the 2015-2016 school year is quite high for such a small graduating class, which makes analysis of anything from this year very difficult. I would recommend not combining the numbers from “in the field” and graduate school in your raw data for analysis. You could have two charts, one where you separate these, and one where you combined them into a yes/no metric for ease of understanding. As it is not explained HOW post-graduation data is gathered, it is difficult for me to comment further, but the program may want to consider the method of outreach to ensure a better response rate. With such small numbers, any number of non-response can really throw off the analysis. Further, does breakout of pre-med and pre-vet (although you already have small numbers) make any difference?

2.1 Course Rotation is followed in the way courses are offered with minimal tutorial/independent study courses.

Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Exemplary.
It is clear when looking through the 5-year program review and having talked to the faculty and faculty associated with the program, that there is a major goal of symbiosis and the understanding that although teaching rigor and quality must remain paramount, that there also must be concessions in order to make the program sustainable (as a business entity within a university). Curriculum changes that have been instituted have been explained thoroughly and have been done in a way as to disrupt the least amount of people without disrupting degree programs (if possible). Curriculum rotation, as it currently stands, is the best that it can be considering that all Biology faculty are voluntarily working on overload to fulfill current needs.

2.2 Reflection on course offerings and enrollment of courses, rotation, and demand is complete.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Exemplary.
I think that the program has taken some brave cuts and moves despite some historical pressure. With that being said, all of the changes were well thought out and had established data from other programs or historical numbers to work from. Some of the biggest changes were seen in the pre-vet program. I believe that these changes were made with sound reasoning and make sense with current veterinary school entrance requirements. For gaining employment “in field” if the student does NOT choose to go to vet school, it will be important to make sure that the student knows that the chemistry minor DOES make them more marketable and at a higher wage in laboratories and similar work environments.
It came out in the student meeting that there was some confusion/frustration involving the pre-vet option at William Woods. For obvious reasons, William Woods has required an introductory set of courses called EQU 117/118 Horse Health Management in its pre-vet sequence so that those moving on will have the necessary understanding of equine management to deal with equine and large-animal veterinary medicine. In my meeting with students, although most were fine with these courses, there were several students disgruntled with this requirement, stating that they did not plan to practice equine medicine, nor planned to ride horses, and felt that this course was unnecessary for their work toward a pre-veterinary degree. Some even said that these courses made them uncomfortable and had been a barrier to their success.
When I met with the biology faculty, we brainstormed this a bit, with me questioning why EQU 117/118 were required. Certainly, the historical nature and the premiere quality of the equine facilities and program should be promoted at William Woods, as it is a unique and key reason why William Woods has a greater acceptance rate into veterinary schools than others (indirect evidence). However, for those students who were not interested or comfortable with the horse component (or with the instructor – there is only one instructor for the equine sections), I suggested that it be part of advising that students did NOT NEED to go the typical “pre-vet” route in order to be eligible for veterinary application. In fact, a regular B.S. in biology with the pre-med option and maybe a few tweaks would allow a student also to be applicable. Therefore, there could be several ways to get to the same goal – Veterinary school admission – with less issue regarding the specificity of the equine courses if they were the barrier to the student’s success at William Woods. Although this is not something I would necessarily suggest separately printing, it may be something worth noting on the B.S. Biology pamphlet (as a sidenote on the bottom), or again in personal advising with students who may not be coming to William Woods specifically for the equine route, or have come for the equine or pre-vet route and have not found the equine part to their liking.

2.3 Course offerings appear appropriate for the needs of the program.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Exemplary.
As stated previously, I think this was well-researched and established in the explanation for both the pre-vet and pre-med concentrations. this was well-researched and established.

2.4Discussion on curriculum changes based on assessment are clearly explained and complete.

Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Exemplary.
Discussion with both the Equestrian Division Chair and The Director of Academic Advising for their input and agreement with the changes only adds merit to the changes as established. Further these changes agree with current trends of other institutions and also agree with easing some faculty loading and current strengths of faculty in the program. All put together, these changes make for a clearer program with less hidden requirements and more flexibility (albeit small) for the students. However, strong and clear advising will be key for this program to work well. Removing the chemistry minor was an arguably good move, but does not decrease the inherent value of a biology major having a chemistry minor in a volatile work market. These types of conversations should be had, especially since it is known that not all pre-vet or pre-med students will gain entry into their desired programs.

2.5 Discussion on curriculum changes based on assessment are detailed and complete.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Exemplary.
This feels very similar to 2.4, but there is enough explanation to detail why the changes are warranted and how the changes will affect the program within each concentration.

2.6 Teaching effectiveness summary within the program is detailed and faculty respond to successes and deficiencies within the evaluation.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
Though I have no doubt, having met with the Biology Faculty, that these numbers likely hold true for each of them, the data as presented in the "Biology_BS_EOC_Data" are not very useful as a whole. Looking at the data holistically, it does appear that the unit is doing a good job as compared to the university at large. However, there is no way to know what the spread of these responses look like. With your n only being n=3, I assume, then there could be large ranges in responses. Further, a 52% response rate of how many biology students? The total is large, but biology number is not shown. Thus, this could be very misleading and is not compelling in its current form.
I take most of my adequate answer from the overwhelming response I got from my visit with Biology students. Although I assume the room could have been cherry-picked, I had between 15-20 students (more than half self-identifying as B.S. Biology) in the room, and I would think you could not get that many cherries. Though I poked, prodded, and otherwise demanded, student responses regarding faculty teaching effectiveness were unparalleled. I had to check for evidence of koolaid. I will expound more on this later, but a more loyal group of students I have never talked to and the sense of community was easily attributed to their feelings of community with the faculty. This, though difficult to measure, was easy to see.

2.7 Course descriptions are detailed and specific. They reflect the levels of rigor identified by Curriculum Committee in their descriptions (100-400 level)
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
The changes in description that have been done as a result of the program review make sense. A few suggestions would be to:

- make clear for BIO 114 (it is clear in 115) that you are doing animal and plant. Many times for transfer this is a confusing thing since some institutions are going to a human only gen bio for health majors.
- In the description of evolution, does this mean that it is a writing intensive course? I assume it is promoting critical thinking, but I do not understand exactly how evolution is being taught - I find the description a bit vague as to the method of the course and what scope is being covered.

- BIO 330 has a typo (not the reason I gave adequate, just letting you know since I am already reviewing).
- BIO 331: should this say “that will”?
- BIO 333: put space in BIO 334. Put decimal after prerequisite.
- There is no description of BIO 334 lab?
- Is BIO 431 Concurrent with 430?
- BIO 390 – please see my discussion on internships. Some more robust tangibles out of this course may be considered.
- In BIO 400, why would animal behavior be considered when it is already on the books?
- Is BIO 418 being taught by someone in education or with an education certificate? If not, what is/are the qualification(s) of the faculty teaching the course and what is the reasoning for its offering? I do not understand how it fits into either the pre-vet or the pre-med pathways, which in itself is not the only reason to offer a course, but I do not remember hearing about a collaboration with the education department and although this definitely notes that it is for secondary education, it does not say it is in collaboration with the education department. Is a better description in order?
- MAT 124 – typo in description.
- CHM 324 and CHM 325 descriptions are extremely vague. If I was trying to do a transfer equate on these it would be very difficult as I would have no idea what spectrum was covered and to what depth.

Over all, why do certain courses have a course fee is confusing to me. Maybe this is addressed in the course catalog. It seems rather random.

3.1 Summarizes all physical equipment needs and supplies noting any deficiencies and the impact on student learning.

Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.

Everything that is written is correct, accurate, and reasonable. Here is the reason I am not writing exemplary: it is TOO reasonable and is not explaining the huge impact this is/could play on student learning. Your faculty should be screaming. They should be screaming for a new building. For better equipment. For more supplies. But they aren’t – and that is the great part. They understand. What I heard on my visit is a faculty AND administration that understands both sides of the coin (what an amazing thing – thank you!). The building and its spaces have literally reached their carrying capacity. At this point, William Woods needs to make a choice of what they want to do – put their resources into making a more robust STEM program – or not. All indicators point to the fact that this area is growing, and quickly, in all sectors of business and that the job market is hot. From the looks of your own market surveys, your graduates get jobs. Your faculty work well together, meet set goals, are reasonable, and are loved by - and successful with - your student body. This is the time to strike – while the iron is hot and your team is in place.

Sure, they can continue to make incremental improvements with the modest requests that they have listed in the 5-year program review, but it is this reviewer’s opinion that this is merely a bandaid approach to a bullet hole problem. There is no reason to increase recruitment and make heroic efforts in retention when there is nowhere to put the students. You are literally already almost at max capacity in terms of teaching load and laboratory space. At best, you may be able to fit maybe 2 FTE more into the program (including another chemist into the mix). This is not going to get you the big returns you are looking for. Further, if you are seriously considering things that hinge on Biology as a feeder program (I understand I am only supposed to be reviewing the BS Biology program right now, but I am going to get on my soap box down the page), then a larger facility that doesn’t have leaking ceilings, porous unsafe tabletops, and ancient lab tools will be needed to get you there.

How does this impact student learning? They didn’t explicitly say it, but it should be said. If this continues, your students will not be able to compete with those coming from schools with modern labs. Computer simulations are not an adequate replacement for true laboratory experience. If the covid crisis showed us anything in the sciences, it was that science students do not learn laboratory techniques well online. This has been documented and employers also know this and will often ask students about their laboratory experience at their university. If you don’t at least supply some of the basic tools of molecular biology, genetics, biochemistry, and proteomics, then your students will not be as competent as others upon graduation. Period.

3.2 Summarizes the physical space available to the program.

Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
The dire need for more room is not truly expressed in this report, but was clear from my visit. Not only was this expressed to me by the faculty, but it was a loud concern expressed by the students that met with me as well. I think that the faculty have a sort of "make-do" attitude that many of us have in higher education when we want to serve our students and know that budgets are tight and funding is iffy. This is to be commended. However, I fear that this congenial nature sometimes allows us to easily be passed over for louder voices. So, let me be loud. The report is accurate. They are **NOT ADA COMPLIANT.** The labs are **NOT SAFE**. There are too many issues to expect them to have to try to fix while also being full-time faculty. They need assistance. They need resources. These issues will not go away. They will get worse. **THEY NEED A NEW BUILDING!**

3.3 Summarizes the technology equipment needs and supplies noting any deficiencies and the impact on student learning.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
The written description does not describe how this lack of technology will affect student learning. Much of the physical equipment associated with the biological labs is now paired with technological equipment for quick data analysis. In fact, so much of the biological equipment has been combined with computer technology that we know have whole classes simply teaching how to use this equipment. Thus, basic technological use and understanding has become necessary for students to be introduced to before graduation.
Further, the use of technology in teaching is absolutely necessary at this point. Smartboards, projectors that work, and computers that are current and usable should be necessary equipment for all faculty to be able to provide instruction to students. The fact that this is not the case for the biology faculty is unacceptable. Minimum standards for technology should be met for the faculty to be able to instruct. Further, technology in the laboratories should be provided so that students can get basic experiences with biological instruments as I mentioned in the previous section.

3.4 Provides summary analysis of library holdings, noting specifically how deficiencies, if any, affect student learning.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
Description of how the library holdings affect student learning is not really addressed. I assume that in writing-intensive courses or research courses, assignments may require the use of library resources. Some examples of these assignments would be helpful to address this question and help substantiate the usefulness of these holdings as well. For example, I often use the library holdings (and a visit to the library) to explain the importance of peer-reviewed journals. Your program may do a similar assignment.

3.5 Faculty qualifications and specific competencies are fully and accurately described.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Exemplary.
All faculty, including adjuncts, have adequate (if not excellent) education in the area that they are teaching.

3.6 Provides a sound rationale for current staffing and/or future recommendations related to student learning.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Needs Improvement.
You first say no, and then kind of say that you might be able to use one. I say an emphatic – YES! I have learned from my days of looking over labor management negotiation and contract work (both sides of the table, actually), that it is never a good idea to plan for people to voluntarily stay on overload. Thus, to state that you do not recommend additional faculty at this time seems like a poor planning position from my point of view. When it is stated that not only all biology faculty, but also your sole chemistry faculty person are all on voluntary overload not only for now, but also for the foreseeable future, this puts you all at a precarious point.
Lets assume that none of you change your mind and you all continue to desire an overload, what happens if one of you falls ill, has an unexpected family tragedy, or decides to leave the institution? This type of dynamic puts a lot of pressure on very few people. Further, if done for very long, it may send the wrong type of message that it isn't hard to work so many contact hours and may have people reconsidering full time work load (something that has been discussed at other small universities – I know how hard you work, don't let people think you don't). Also, why wouldn't you ask for another position now? You are looking to potentially expand a couple of classes, there may be a few more labs opening up, you have identified a want/need for a person with some plant specialization…why wouldn't you put that out there? I think it could be argued from multiple angles that another position could easily be supported. You all are on overload…so that makes at least 9ish contact hours? Another person to add an additional concentration area, more advising ability, another person to handle the daily to-do list on committees, etc. Why not ask?

3.7 Provides rationale and recommendations to improve resources that would address such deficiencies and link to student learning.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
Briefly mentions addition could help with plant or gen bio classes. Also mentions support for currently defunct nursing program.

3.8 Provides sound rationale on the financial aspects of the program. Reflects on the cost per major and fiscal needs of the program.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Not evidenced.
No cost per major provided. Brief statement that Program budget is appropriate. This is confusing since it does not appear that instruments for labs are provided or upkeep is provided, and technology is not updated or replaced, so I would NOT assume that the budget would be considered appropriate. These types of technology/laboratory maintenance issues should be considered part of a Biology programs budget, in my opinion.

4.1 Includes university learning outcomes and assessment measures, which are clearly articulated.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
The importance of internships described in both Major Field Competence as well as Self-Liberation is a bit confusing to me. This is especially true since it was described as not being formal or categorized earlier in this document. I made some comments about this, and the lack of its description (even though it is also described as a course) earlier in the document. I also see in several areas references to "shadowing" experiences and "volunteer" experiences in different areas of assessment. I think that it is very important in this assessment that these terms have a formal definition or that they be used very specifically. Since there is a formal class that is described as a Biology Internship for credit, non-credit internships should be described in a different manner, or they will be confused as internships for credit. Further, although BIO 450 is specifically used as an example for Major Field Competence, no other University Objectives are included with Biology Course alignment examples. Though general discussion is given on how the program meets the objective, course examples would give some better indications of how alignment is happening.

4.2 Includes program learning outcomes and assessment, which are clearly explained.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
It is discussed that learning outcomes have been changed marginally a couple of times over the 5-year span, which makes analysis a bit more tricky. Further, though the method of assessment is described, the reason each method has been chosen is a bit vague. For example, use of the MFT where overall change from beginning to end is analyzed seems like a good indicator of learning and a reasonable change for assessment; however, goals and reasoning for these goals are not explained. There is mention that the program is satisfied when end scores approach the 50% mark, which is confusing to me since this does not seem to follow the % change assessment marker that I thought the program felt was a better indicator. I assume that because this is a very recent change they may not have fleshed these goals out well yet, but there was no discussion to be able to understand that.
Another point that caught my eye was mentioned in the 2017-2018 annual assessment report. In this report, it is discussed that there was a failure of students to meet benchmarks due to the fact that questions were not appropriately written to address the benchmark topics. Although I think I understand what is meant by this remark – that specific objectives of the benchmark were not specifically being asked in the exam in a meaningful way, I also wonder if by creating questions written specifically for this benchmark, if you have now in some way eroded the integrity of your assessment a bit. Again, I could be misunderstanding the remark. In the Assessment snapshot, it notes that Dr. Greenland-White has specific exam questions she uses and that this is the reason that the benchmark "has been consistently met." So is the desire that the students just know the answer to the question and respond back? This is a bit confusing to me. It sounds almost like a student could memorize these. Maybe that is the point of this exercise?
My department struggled with this issue as well, where we felt that we were not assessing students well by using different verbage or question styles and therefore not testing them appropriately for our personal objectives for assessment. However, we also found that when we tried to create material to help the students, we corrupted some of our assessment since we almost started training students for the test, or basically teaching them specifically to answer the test questions – as is the problem facing k-12 and standardized testing. I only bring this up, not because I have a solution, but as a precaution that this is something to think about as you create these assessment tools. When too many students are meeting benchmarks, is it that you are a wonderful teacher, or is it that you have a poor benchmark? What is the purpose of your benchmark?
I like the combination of using core courses across academic years and with different instructors to spread the assessment objectives. I think that this strengthens this tool. I also agree with you that one annual assessment report over the Biology Program including both the B.S. and the B.A. makes the most sense at this time for your Program considering the number of students and amount of overlap between the areas.

4.3 Standards for performance and gaps in student learning are clearly identified with action plans for improvement if needed.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
On student Performance Review Days you mention that students have a qualitative review by two faculty members over CV/resume, mock interview, and a shadowing survey. I did not see a copy of a rubric for this particular event put into the files. How is this judged? Are the students aware of the expectations (I assume they are). How is this assessment utilized within the department to elicit change or assessment? Further, there is mention of assessment being done in the BIO 450 course, but it is not explained how assessment is done in this course or how this assessment is used in departmental assessment process.
Standards for performance need to be further developed. In some areas of the report, I saw some discussion of goals of 60% on the MFT, but I don't think this fits with your new (and I think more profound) decision to look at overall change in MFT scores. Laying down specific goals will be helpful to use as guides for your program. Further, I did not see specific plans for improvement should these benchmarks not be reached. Since these last 5 years have been relatively successful, you probably have not felt the pressure to have to put such a plan in place, but it is always good to know what plan you will institute should you have an outlier class that does not perform to standard.

4.4 The student learning objectives are appropriate for the specific discipline.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Exemplary.
This was done well. Learning objectives covered across discipline, across instructor, and across course level. The course matrix maps were well done and made sense and included objectives that are at the core of Biology.

4.5 Includes a longitudinal view of assessment for each program learning outcome.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
There is a matrix included that describes how and when assessment objectives should be introduced, practiced, mastered, and assessed. Although not fully described, if this matrix is followed, it seemed reasonable and easy to understand.

4.6 Discussion on the assessment process over the 5-year span.
Please rate the statement with: 3-Exemplary, 2-Adequate, 1-Needs Improvement, or 0-Not Evidenced and then justify your rating in the below section.

Adequate.
Please note that I was only provided a 4-year snapshot of the assessment data, though I did have the 2015-2016 Annual Assessment provided separately. This is because this previous report used the “old” biology objectives, while the 2016-current reports utilize the “new” biology objectives. This makes sense to me and I feel that comparing the reports would be a bit like apples to oranges so this was totally appropriate, but wanted to make sure to note it since the title of this section especially notes 5 years. The 2015-2016 report, from what I could tell from reading it, appeared to follow similar trends in terms of success rates, regardless of different questions, as one would expect.
For the 4-year assessment with the “new” objectives, assessment objectives seem reasonable, as does the process and method of assessment, though some of the qualitative details of how assessment happens with senior performance review and within the BIO 450 course need some detail and refinement. The biggest problem with assessment is that you can gather all of this data, but you have to have a purpose for it. I encourage the biology program to firm up their assessment goals to really define what outcomes you are truly working toward. Is it MFT final exam %? Is it % change? What number ranges are you looking to get? If outside those ranges, then what changes in course(s), tutoring, teaching, approach, etc., will that trigger?
The qualitative portions of the assessment data seem to be the most murky. Are there rubrics that have been created to guide this process? If not, there ought to be. What standards are you looking for on CVs, resumes, reflection papers, etc.? What are you looking for in a mock interview? If you are having students not meet those standards, then what changes will that entail? This will also help outside reviewers to make sure that you are aligned with other programs and industry standards (or if you are asking something different – then WHY you are asking something different).
The matrices provided were very helpful in visualizing the assessment process across a 4-year span of a 4-year graduation plan. Then, looking at the assessment snapshot, it was good to evaluate the four years together. Although there was statistically significant variation between years, this is expected with the number of graduates the program has, and is really only true for one or two years, depending on the standard deviation (which is not shown). Overall, the data is remarkably consistent for such small cohorts, which leads one to believe that the program is supportive of a consistent product – trained biologists.

External Reviewer Summary Statements

- **What do you see as strength’s for the program's?**

The primary strength of this program is the sense of community that has been built within it. This community has been built from two places: a group of faculty that work hard to work together and work for the students, and a set of students who are excited about school, utilize their resources, and recognize great faculty. This mix is a magical combination that creates a bonding environment where learning is fun, exciting, and inherent both in the classroom and also in less formal or out-of-classroom experiences like dynamic advising, student organizations, and internships and shadowing.
You also have faculty that make themselves very visible in showing the students that they are valuable. The students told me that they see the faculty buying things for the labs from their own pockets. They see the investment. Everyone likes to feel invested in. When I talked to the faculty, they said they feel invested in by the new administration. That is important. I felt that everyone felt hopeful that positive change could be made with student learning as the impetus. That is the hallmark of a successful academic institution.

● Does the program have components that distinguish it from other programs?

Yes. The individual advising, open-door policy, and access to personal and appropriate relationship with a small faculty body is a unique thing found at William Woods. Further, as previously described, the cultivated community experience appears to be one that has been successful and enjoyed (at least by the roughly 20 students that I talked to). Students said things like that they never struggled to get help in classes because the professors were readily available to help. Further, many of them described their time at William Woods as a sense of family and were extremely loyal to the program and the faculty.
Further, and this is no surprise, the amazing equine facilities and access to equine procedures are very much something that William Woods is known for and sets them apart. I mentioned this earlier, but this might actually also be a hindrance at times as it is so much the flagship of the university and also the pre-vet program. Sometimes, when people changes their minds and do not want to work with horses, we forget that there might be other ways to be able to get to the same endpoint. However, there is no doubt that the equine program is a major draw for students, even from states away, and is something that should continue to be used as a highlight of William Woods' recruitment strategy.

● What areas need to be addressed and are the steps outlined in the program review adequately to address any areas of concern?

Having read through William Woods 2021-2026 Strategic Plan, I was excited to see that literally the FIRST objective (1.1) was to "Provide sufficient resources and personnel to support existing programs." Although I have mentioned some of this earlier in this review, I would like to discuss in more detail here.
One MAJOR concern that I was not able to address in the program review questions was the problem of laboratory safety. This actually goes beyond just the simple points of the building not being ADA compliant and that tabletops and equipment is aging and rotting, but I also found out that the University does not have an Environmental Safety Officer, nor do they have a plan for Hazardous Waste disposal.
Having been in this game a while, and coming from a background where I utilized hazardous wastes daily in my research, I can tell you that these laws and procedures have changed drastically in the last 10 years. What could simply go in the trash and down the drain 10 years ago now needs special paperwork and a special note to the dump, or potentially an additional fee or a hazardous waste truck to be disposed of. Simple things utilized in microbiology, anatomy and physiology, molecular biology, and other undergraduate labs are now considered under this heading and must be stored under special fume hoods, in flammable cabinets, or sometimes in separate rooms.
Honestly, this is more than the average faculty member can keep up with or should be expected to. In order to have working labs on a university campus with students working in them, someone must be responsible to maintain that they all have PPE (especially in this time of covid and dependent on which lab they are in, this will require different PPE), chemicals will need to be stored appropriately and disposed of appropriately, someone should probably catalog orders of specific categories of chemicals and bacteria that are on hand (i.e. if your micro lab is using a class II strain of a bacteria someone may want to know about it in case something happens to that faculty member).
Proper signage and MSDS papers must be kept for all chemicals in the lab and chemicals must be inspected to make sure that they are not out of date or damaged or in an improper container. These are just a few of the absolute basics, there is far too much to mention. This could cause a major issue for Fire and EMS crews who need access to the labs during breaks or when faculty are not there (or even when they are there if this documentation is not available). I am not

sure who is currently in charge of this, but it is a huge job and far too much for individual faculty to have to maintain in this day and age.

● Should the program be expanded, maintained at its current size, reduced, or eliminated?

My next point of concern is that we cannot expect faculty to continue teaching on overload indefinitely and call that a reasonable plan for moving forward. There is clear justification and proof that at least a 0.5 if not a full FTE Biology position can be supported at this time (in work, I have not seen budget numbers). Understandably, with incoming student numbers being as variable as they are nationally and at William Woods, it is difficult to predict the future, however, biology classes seem to consistently be filling and there is evidence that they can fill courses from other disciplines if needed (i.e. exercise physiology, education (?), equine science (?)). Further, this person could potentially lessen the stress on the chemistry program, which is also overloaded. The need is apparent.

● Any additional thoughts, comments, or recommendations pertaining to the program?

The other need, which has literally created a situation where the Biology program is arguably at carrying capacity until it is resolved, is the issue of the Science Building. Leaking ceilings, narrow halls, steep steps, small rooms, drafty windows, and inefficient ventilation all have created a scenario whereby continued renovation of the science building would be slapping lipstick on a pig. Trying to create a scenario that could make the building ADA compliant and a safe scientific space would be more expensive in the long run than just creating new.
William Woods is now at a fork in the road where a larger decision must be made – not just for the Biology Program, but for STEM in general. While there, I heard continued enthusiasm about hopes for a restart of a potential nursing program. I heard hopes of bringing back the Physics major and Chemisty major. I heard hopes of expansion of the Biology program. But things cannot be done within the current building. Certainly a course or two could be added. I think a faculty member added would work. But major expansion? There is nowhere to put them and no infrastructure to support it. On your website for your B.S. promotional material, your first bullet point states that William Woods will allow students to “enjoy mentoring and hands-on learning in all of our science courses.” The big question now is – Will you? The faculty need updated labs that have current equipment that allow these hands-on experiences. They are ready. Are you

Conclusions and Recommendations

Program Response to the External Review Report

Response
Please respond to all scores of a "Needs Improvement" or "Not Evidenced" made by the reviewer. Please note in the text which question you are discussing and then proceed with the response. Be thorough in your response.

Biology Faculty Response to External Review report-BS
1.3. Clearly describes the approach to maintain or improve student retention and graduation rates. **Needs Improvements.**
Response to Reviewer
The Biology Department has a program goal of 75% retention between freshman and sophomores, a 90% persistence per year, and with a 100% completing the program that enter their senior year. By our program goal mentioned above, we would expect a graduation rate ~60%.
Our department’s approach to the 75% retention is through multiple factors:

- As much interaction with the full-time biology faculty as possible through the freshman Biology Core courses (lecture and lab)
- Easy access to the not only the Biology Faculty, but those teaching Chemistry, Math, and Physics
- Having an event sponsored by the department in early fall to help them generate a 4-year degree plan
- Specifically planned interactions with upper class majors

- Involvement in Clubs

The Biology Core consists of General Biology I and II (BIO114/115 & BIO124/125) and Genetics (BIO231/232), and all of the lectures and laboratory classes are taught by our full-time faculty. The hope is that through the core courses, our students are able to establish meaningful faculty/student relationships and feel comfortable going to the biology faculty with any questions or problems they might have. Prior to a freshman's first advising appointment, the Department holds a 4-year planning session to help them fully understand and have a plan moving forward of how they will complete their degree as well as any minors, General Education studies, and other graduation requirements. The 4-year planning sheet (document attached in report as support) is used during this planning event where both faculty and upper-class students help the freshmen make their 4-year plan. During Student Performance Review (SPR) days in the spring semester, the last few years as included an "Impartation of Wisdom Lunch" with just our graduating seniors and our freshman (first year students). The students are divided into small groups of one senior and a few freshman students (depending on numbers) to allow for a lot of one-on-one interactions of just students, no faculty allowed. The department provides lunch and a few questions to help start the conversations, and then the faculty leave the room and allow the freshman students to talk with and ask the upper class majors the few questions and anything else they want to ask. The luncheon this SPR day (2022), seemed to be quite a success as the buzz from the room was noticeable down the hall and many freshmen discussed with faculty how much they liked it and how better they felt about WWU and the Biology program here.

We have four very active clubs, Biology Club, Conservation Club, Pre-Vet Club, and the Pre-Health Professionals Club. We find the numerous types of clubs allow our "freshman" students the opportunity to become activity in clubs the first semester they are on campus. Making those personal connections with other Biology Majors with similar interests is incredibly important for retention and is another example of how incoming and upper-class students can interact.

In terms of persistence, we honestly feel if our Biology Majors make it through the core set of classes (through Genetics) then there is a very high probably of them staying and graduating from William Woods, which is why we have a 90% persistence rate per year, and then a 100% graduation rate of those that enter their senior year as our goal. For the reasons stated above, the reason students stay at WWU is because of their interactions with faculty and how vested the faculty are in their success. It is definitely not our facilities they keep them here, and in some cases our facilities are the reason for some to leave after their sophomore or junior year. One thing that cannot be accounted for in our current system is if a student changes from a Bachelor of Science in Biology to a Bachelor of Arts in Biology. So even though the student has "left" the degree, they still persist as a Biology Major.

The Bachelor of Science in Biology with a Pre-Nursing concentration was continually mentioned because we feel while it was only a handful of students, due to the overall lower enrollment numbers on campus the past several years the loss of those students would definitely affect our retention, persistence, and graduation for the next **several** years.

The Biology faculty have met almost yearly with representatives from admissions and given them several ideas of where and how to recruit students that our program would be a good fit for our Biology Programs. These ideas are included reaching out to 4-H, FFA, and Hunting clubs for the BA degree as many of those have conservation and ecology-based projects and roots, as well as recruiting from STEM and College prep high schools for any of the three Biology degree programs. The problem has been the overall recruitment and enrollment on campus as a whole, with on-ground enrollment at all-time low. The biology faculty are hopeful with the 2021 hire of a new Vice President of Enrollment Management (Jennifer Crump), a new University President (Dr. Jeremy Moreland) in October of 2021, the creation and hiring of a new Chief Student Experience Officer (Ted Blashak) in March of 2022, and a contract with EAB starting in the fall of 2022 that we will see an increase in enrollment on campus as a whole. As campus enrollment increases, the Office of Enrollment and Admission can put more effort in getting a diverse set of Biology Majors.

1.4 Program has clearly defined strategies for retention and graduation rates of students. **Not Evidenced.**

Our Response to Reviewer

The Biology Faculty feel the Response to 1.3 addresses both 1.3 and 1.4, but will elaborate a few things here.

The Biology Department has a program goal of 75% retention between freshman and sophomores, a 90% persistence per year, and with a 100% completing the program that enter their senior year. By our program goal mentioned above, we would expect a graduation rate ~60%.

One major problem with the current method for measuring our retention, persistence, and graduation rates accurately, is the fact our Biology Majors often change which of the three Biology degree programs they are enrolled in during their years here at William Woods. So, while we retain that student as a Biology Major, a student changing from being a BS PreVet major to a BA Biology major has an effect on the report numbers and rates. Meaning the graduation numbers and rates are now skewed because the student "dropped" the BS Biology PreVet Concentration degree and "added" a BA Biology degree. This problem may have an effect on all three enrollment, retention, and graduation rates reported.

In addition, the biology faculty feel we have created a curriculum with the appropriate amount of rigor required to compete with other biology programs at other colleges. Therefore, we know there are always a handful of students every fall that start as Biology majors and for various reasons, realize a biology degree and career is not for them. In our role as academic advisors, the biology faculty always want what is in the best interest of the student. For some of our students, that means having a difficult with a biology student after receiving really low grades (or failing) and helping our advisees

find another degree at William Woods that is more suited toward their interests and where they can excel academically. This has an effect on our retention and graduation rates, and the Biology faculty have taken all of that into account when setting our rates.

1.7 Comprehensive accounting of graduates in internship placements. **Not Evidenced.**

Our Response to Reviewer

While BIO390 (Internship I) is a course on the program books, it is a course that has not been formally taught in over a decade or more. The Biology Faculty feel this course would only be taught if we had a formal collaboration with an agency, business, etc. that we could offer the class on a consistent basis over the summer. While every internship, formal or informal, is a valuable experience for a student and helps in making an incredibly strong application for a job, graduate school, or professional school, not every internship is worth 300-level credit. Since our degree checklists all include 10 hours of upper-level biology courses beyond the required courses, we are reluctant to give course credit. However, the biology faculty all encourage, support, and help our students find and apply for summer internships, via editing personal statements and writing reference letters; however, we do not feel the students need it as credit. In fact, in speaking with a few academic deans for many of the common graduate and professional programs our majors apply, we have been told many prefer and favor highly those that gain experience “without formal credit” more than those having an internship course on their transcript as they feel it shows motivation and commitment to the field.

The term “shadowing” has a very defined meaning in both human and veterinary medicine. The term “Shadowing” is a word used to describe following alongside a doctor or veterinarian for a period of time to get an idea of what their job entails and gain knowledge about the career. At our Biology Retreat we talk about shadowing, what that means, and how to self-track. In addition, the PreVet club and the Health Professionals club have several meetings around shadowing.

The biology faculty will admit, we could do a better job at tracking the internships our students do get over the summer, as well as the shadow hours they obtain over the summer and breaks. The Research/Shadowing experience survey we give our majors during our student performance days in February are the way we try and keep track of the internship data. It was our error for not including that type of data in our 5-year Review Report. However, with only three biology faculty already spread thin via teaching load, meeting with perspectives, advising, committees, mentoring research projects, we admit our data and records are not at the level we would like. Maybe with the new position of a Chief Student Experience Officer, we can have discussions about more formally documenting all our students do that would fall under internships.

1.9 Post-Graduation data is complete and provides a picture of where students go after graduation. **Needs Improvement.**

Response to Reviewer

The post-graduation data gathered for Biology Graduate and Employment charts comes from various sources. The graduation numbers are supplied by the University and the employment data is supplied by the biology faculty and our contact with various alums. Our Alumni Office often asks the department for updates on alumni, and we feel that should be the other way around. While we reach out to students, we do not have good employment data beyond one year out unless our former students reach out to us in some manner. As part of a survey during SPR days, we ask our graduating senior their plans for the next year. After a year, if additional contact is made then we can update our records and if we lose contact, we put them as “no data.” A system was started a couple years ago in which faculty or students could update their employment status, but it has not been widely utilized. So again, the burden for maintaining employment data falls primarily on the biology faculty that, as already mentioned, are spread incredibly thin. It has been an expectation that beyond our teaching, advising, and committee duties the faculty are continually asked to collect data for the University. As an institute of higher learning, faculty should be able to contact someone at the university and get the data required to fully complete a 5-year review properly. The biology faculty are always willing to help, but as we have grown our department and now have double digits graduates per year, it has become incredibly difficult to maintain good records. In the Bachelor of Science, this is even harder when the data from the University’s data between the number of BS majors total, does not equal the total of the declared concentrations.

Our hope is with the March 2022 hiring of Ted Blashak as the new position of a Chief Student Experience Officer, there will be a push to follow-up with students and a better system established for maintaining engagement of our alumni.

3.6 Provides a sound rationale for current staffing and/or future recommendations related to student learning. **Needs Improvement.**

Response to Reviewer

We feel that there may have been a bit of a miscommunication on this issue when we met with the reviewer. We, the science faculty, do think we need additional faculty and would very much love to be able to teach at load and not overload. We are currently struggling to figure out how to continue our COX fellowship while meeting the required courses to offer. There are multiple ways that we could use an additional faculty line or more. Additional faculty in Biology, Chemistry, or Physics, a hybrid faculty that could cross disciplines, or a non-faculty position that could help across all 100

level labs would all really help reduce the load on all of us and allow us to be more cmplete faculty members. But again, we agree with the reviewer that we are constantly teaching at overload and that this is not only unsustainable, but limits our ability to pursue other scholarly activities, which not only affects us professionally but reduces opportunities for our undergraduates as well.

3.8 Provides sound rationale on the financial aspects of the program. Reflects on the cost per major and fiscal needs of the program. **Not evidenced.**

Response to Reviewer

The science department does not disagree with this opinion but it is not necessarily how our budgets operate. Our budget is sufficient for day-to-day operations and some upkeep. It is not sufficient for full maintenance of equipment like microscopes are replacing mid to large expense equipment when needed. This money is pulled from a separate facilities/equipment fund, which I don't believe our department requested often enough historically. We are now more proactive in requesting funding for replacing required equipment and we will know more by the next report if we are able to get access to funds to keep the lab in its required condition or if we will continue to experience equipment attrition.

Response to Reviewer's Summary Statements

Laboratory safety B.S.

In response to the laboratory safety concerns raised in the summary, we are taking steps to improve, though we are unable to solve all of the concerns at the level of the Biology Department. The ADA compliance issues we address in the next section when we address the physical space and the needs of the building.

As a Biology Department, we will work to develop a lab-safety plan by September 2022. This safety plan will address improving storage, signage, and cataloguing of our materials. This plan will include collecting the Safety Data Sheets for the hazardous materials we store and including them in a quick safety reference guide for each laboratory. Additionally, this safety plan will introduce some standard-operating procedures with regards to how remove hazardous waste, handle live specimens (mostly microorganisms), and maintain the labs.

We acknowledge that the lack of a University-wide hazardous waste disposal plan is concerning. Our current work-around is to hire the outside company Stericycle to pick up hazardous waste about once a semester. This practice is not ideal as it necessitates storing hazardous waste for several months at a time, and puts the responsibility of coordinating this as a burden on individual faculty members. However, it is functional, and we are able to dispose of hazardous waste instead of having it build up in the Cox building.

In regards to the aging equipment, yes, much of our equipment is old, but we believe what we use is still able to perform its function. We are aware of our limitations and have worked to ensure that we offer lab activities that we can do safely within the constraints of our laboratories.

The only aging equipment that we are deeply concerned about from a safety standpoint are the fume hoods and lab benchtops. The Cox building has only one functional fume hood. This means that while individual projects requiring a fume hood can be done, but we don't offer labs in which every student needs to use a fume hood. We do not have the funding to replace the non-functional fume hoods. The other area of concern are the lab benchtops which have been continually in use for years and have lost their finish. The benchtops are now porous, meaning that materials in use on the benchtops can be absorbed into the benchtops. We have requested replacement or refinishing of those benches every year for at least the past five years but have not been able to do that. Until we are able to have the benches replaced or refinished we will continue to have students work out of pans and splash trays when they work with concerning material, though even that is not a perfect solution as spills can and do occur.

The bigger concern is what the reviewer describes as "rotting" of material—the Cox building routinely leaks from the celling (even on the ground floor). This has in the past caused damage to some materials, though we now know to keep anything valuable or delicate away from the portions of the buildings that have this problem. The infrastructure challenge has resulted in mold in the building. The University is aware of this problem and has sought to ameliorate it with a mold-abatement team that came in at the beginning Fall semester 2021. This has helped, but the overall infrastructure problem is beyond the scope of the Biology department.

Similarly, we are unable to directly address the concern over not having an Environmental Safety Officer. No one of us is able to fill this role that is typically a college or University-wide full-time position and we have no control over that. The lack of a university-wide system for this does mean that much of the burden for implementing safe practices fall onto faculty that are already at or near capacity. These types of things include individual faculty members needing to stay aware of ever-changing safety protocols for materials, working through the backlog of materials stored in the cupboards (some of which have been there for longer than we've been alive!), bringing labcoats home to wash and return as there is no mechanism for that currently on campus, and checking for and clearing mold prior to starting class in a given semester. We would appreciate additional support or resources for these laboratory safety requirements, until then we will continue to operate as best we can in the constraints we have.

Building needs/size/physical demands of the space in summary

In response to the final comments and recommendations we recognize the value in what the reviewer says about the building needs and the physical demands of the space. We have work-around for many of these concerns, but feel that the long-term solutions must be addressed from the level of the university, rather than by individual faculty or the biology department.
As pointed out, the building is not ADA compliant. When students are unable to come to lab because of accessibility issues the responsibility has been on the individual faculty member to meet with the student in an accessible location and try to do what of the lab activities are possible or give them material to do this at home. This is challenging as we don't have access to ADA accessible lab space, and much of the equipment we use, such as a gel imager, or large water baths, centrifuges, microscopes, and other equipment cannot feasibly be transported between buildings. Many times these constraints mean that students who are unable to access the building have to complete similar online labs, as opposed to the identical lab that their classmates are doing. With the necessity of hybrid labs these past two years the biology faculty have gotten better at developing meaningful at-home or online labs, though it is not the same as in-person hands-on experience.
The capacity of the biology department, loads of individual faculty members, and the size and functionality of the building are all tied together. As it currently stands the building is full and we are using all of the lab space we have. There is enough work for another at least 0.5 Biology position, though until lab or classroom space is increased, there isn't a good place to house someone in that position. Similarity, while an Environmental Safety Officer would be helpful, such a person would be stymied by the same physical constraints that we are (e.g. the building leaks and the fume hoods and benchtops need fixed).
In summary, we can maintain our current student capacity, and continue to hold labs and work to utilize the Cox building as effectively as possible. Unless and until we are able to utilize more functional lab space we are hampered in our ability to increase the size of the biology department in any meaningful way (either additional faculty or additional students).

Program Identified Strengths
Discuss strengths of the program as they impact student learning.

The main strengths of the program are a culture that encourages focus on the students, a rigorous breadth and depth of teaching, and an engaged faculty that seeks for continued improvement.
The student-focused strength of the program is evidenced by a variety of practices, including having faculty teach labs where they are able to get to know student even better than in a typical lecture class, full-time faculty (rather than adjuncts) teaching most majors classes, and accessible faculty with liberal office hours and opportunities to meet with students. The supportive culture of student engagement promotes one-on-one interactions between faculty and students. This occurs through honors research, mentor-mentee projects, Cox research activities, and office-hour conversations as students come to the faculty for everything from content-specific help, to interview-practice, and experimental design questions.
The biology program is not seeking to encourage a cut-throat or "only a few can make it" competitive feeling among the students. There is ample opportunity for struggling students to work with academically-stronger peers and the classes are designed to help give many students opportunities to succeed. At the same time, the faculty is committed to providing a rigorous and high-quality education. Students who engage in the material and take the range of classes we offer are extremely well-prepared for future academic work. We strive to provide a depth to our classes that is comparable to what students would get at more "competitive" universities. It seems to be working. Many students tell us later that their coursework here prepared them for success in professional schools. This year alone one student from our graduating class of 2021 is currently the top-ranked student in her class at the University of Missouri's veterinary program, and another student who graduated last year and is currently in a pharmacology and toxicology PhD program has a 4.0 and credits some of her success to the preparation she received here.
This competence, enthusiasm and engagement of the faculty is the other main strength of the program. This is evidenced by close collaboration between the biology faculty including weekly meetings designed to address the needs of individual students and the biology program as a whole. This collaboration makes varied events such as the end-of-year biology party for the students, the Fall semester "plan your life" biology retreat, and the host of club events, special speakers, and LEAD events both possible and successful. This collaborative effort also prompts the continued assessment and improvement of the program as a whole as we learn from yearly assessment feedback, and what did or didn't work in a classroom or the program to make adjustments to the program.
While the biology program does face challenges that are only addressable at the level of the University, we also feel that faculty have been given the power needed to implement changes in courses and rotations as needed to best suit changing needs and demands. Faculty are able to have autonomy over their classes and this has led to valuable outcomes including collaborations with the University of Missouri for some lab work, changes to when classes are offered to make them more accessible to students, the ability to try new lab activities to suit a particular class, and interesting

field-trip opportunities. This autonomy has empowered the (very busy!) faculty to stay engaged with their teaching and to continue to bring new ideas and enthusiasm to the classroom and the program.

Program Identified Challenges
Discuss any challenges of the program as they impact student learning. What is the program doing to combat these challenges?

There are primarily four challenges that we have. Aging building, deferred maintenance of equipment, faculty under constant overload, and incoming students that are less academically prepared.
There is little we can do with an aging building. We do the best we can with the facilities we have, but this is out of our scope to fix. This impacts recruitment, our labs, and our classrooms. Hopefully the tech committee will help solve some of the classroom issues, but it will not be able to address not being ADA accessible and the overall challenges with an older building.
We are working on deferred maintenance and plan to spend whatever we have left over in our budget to replace and service as much equipment as possible. This is something we can never get caught up on since as we do, the equipment requires more maintenance, but we can try to make sure that we have the majority of our equipment working. Students need to group up to share equipment and sometimes that means larger groups than we'd prefer but we do the best that we can with the equipment and budget we have.
Our faculty, including Chemistry and Physics are in constant overload. This is not a claim that we should utilize more adjuncts, we understand that conversation and our choices. The issue is with our number of students and required classes for the diversity of professional programs, graduate programs, and careers they are pursuing we just don't have the faculty to do it. The biggest challenge with this is that we are unable to engage in some of the mentor/mentee and Cox Fellowship, and generic research that we would otherwise like to. Burnout is also a concern though we all seem to be holding up pretty well. We will continue to advocate for an additional faculty line.
The final challenge is that we have such a range of academically prepared students that enter, particularly in their relationship with math. We welcome all students and we work hard to provide a path for every student to succeed in biology, but there are challenges bringing students from where they come in to where they need to end up in four years. This also provides challenges, especially in the first year sequence in Biology and Chemistry, in how to spend classroom time. You don't want to leave students behind or bored. We recognize this is not unique to our discipline. Our solution is to be constantly available and utilizing a large amount of time on a smaller group of under-prepared students. Combine this with perpetual overload, it seems like we are moving to more and more work, with the same hours in the day.

Action Plan
What is the plan for the program moving forward. What anticipated changes will be implemented as a result of this report?

One of the biggest challenges is teaching the Biologists of tomorrow in labs that are equipped in the past. While our building and equipment is not up to the lab standards today, the biology faculty will continue to provide the best experience possible to our majors. This plan includes, but is not limited to, the following action plans to implement.

- We are looking into some short time fixes for the lab benches until new benchtops can be purchased. This would at least provide a safe, non-porous environment in which students can conduct experiments.
- In this review, the lack of standard lab protocols, MSDS sheets, and safety plans is extremely obvious in our labs. In the response to the reviewer, we have laid out some of these plans, and have already started to gather necessary material to provide better lab safety.
- The Director of Intercollegiate Athletics, Jason Vittone, has agreed to allow the biology department access to the washers and dryers in the athletic facilities. This will allow the Lab Coats we provide for the students to be washed at least once a semester.
- Lab equipment is being replaced as things break and as smaller equipment is needed. We are slowly getting newer equipment, which is extremely helpful for our cell/molecular and anatomy labs.
- In completing the 5-year review, we realized we need to do a much better job of having our Assessment data in easy to review form. By having a single document that we "update" at the end of each semester during assessment, it should make that portion of the plan easier to pull together.
- One major problem is the wide range of academic preparedness our incoming students are showing. We are seeing more and more bi-modal class grades with the gap between the two widening every year. The Biology faculty are committed to meeting weekly during the semester to help catch any major issues early with our advisees.

- The Biology Faculty work hard to build rapport and connections with not only our advisees, but with all of our students. With William Woods being a small university, having faculty that “truly care” about our students is one thing that sets us apart from other programs. Our plan is to continue this approach.
- We have found it is extremely hard to keep in touch with our alumni once they have graduated. Therefore, it makes it very difficult to determine if they have successfully gained employment in the field or not. We hope to work with the Alumni Engagement Coordinator, Jeneva Pace, and generate a more effective way to maintain contact with our alums. What is our responsibility vs alumni things, make a data base
- In completing the 5-year review, we realized we need to do a much better job of tracking the amazing internships and shadowing experiences our students are having. During student Performance Review days, we have all our majors feel out a survey about their shadowing, research, and internship experience for the past year. While we have this data, we did not include the specifics in the 5-year report and the review noted it (as she should have). We are building a database that we “update” using the survey data obtained during SPR days every spring and will be sure to include this data in our next report.

Overall, we feel confident in the curriculum in the Biology Program we have developed. The Biology Faculty feel that we are providing quality courses that are preparing our graduates to succeed at the next level. Some of most recent graduates returned to WWU for alumni weekend recently, and discussed how prepared they were for Vet School and Graduate School compared to their peers from other, often larger, universities. As scientist, we are continually evaluating our program and if there is anything we can do to “make it better.” If this report has taught us anything, it is that if we can provide a quality education to our biology majors with old facilities, outdated equipment, and overworked faculty, then image the level our Biology Program could reach with new facilities, updated/new equipment, and enough faculty to reduce overload and provide additional content to our students.

The Biology Faculty are more than happy to provide any additional data/evidence or to meet and answer any questions as needed to fully assess the Bachelor of Science in Biology Program and our Pre-Med and Pre-Vet Concentrations.

Academic Council Review

3=Exemplary 2=Adequate 1=Needs Improvement 0= Not Evidenced

Program Profile		
1.1	History of the program is succinct, but detailed. (-300 words)	2
Comments:		
1.2	Program's purpose/mission is clear, including relationship to the university's mission statement.	2
Comments: Successfully describes how the mission is aligned to the university mission		
1.3	Clearly describes the approach to maintain or improve student retention and graduation rates.	2
Comments: Goals are provided but no approach to achieving the goals is provided. Also, the program provides a reflection on the retention numbers (meeting the prompt), but not an approach for improvement.		
1.4	Program has clearly defined strategies for retention and graduation rates of students.	2
Comments: The program has strong retention but it is not clear so to what leads to such a strong retention. It would be helpful to articulate the specific strengths that make the program so strong.		
1.5	Program advising loads are appropriately delegated throughout the program	2
Comments: The program works well with the limitations of resources and created a strong model of advising with the advising retreat.		
1.6	Program has clearly articulated advising processes followed by all faculty within the program.	2
Comments: The 4-year planning sessions is a good idea and a great way to use the resources that they have when advising the group.		
1.7	Comprehensive accounting of graduates in internship placements	NA
Comments: An internship is not a requirement of this degree		
1.8	Provides detailed description of possible employment positions for graduated students.	2
Comments:		
1.9	Post-graduation data is complete and provides a picture of where students go after graduation.	2
Comments: The university struggles with capturing alumni data, but there are a larger number of "unknowns" in the data without any explanation than expected for an on-ground program.		
Curriculum		
2.1	Course rotation is followed in the way courses are offered with minimal tutorial/independent study courses.	3
Comments: course enrollments show that students are successfully advised and the need for tutorials/independent study courses is minimal.		
2.2	Reflection on course offerings and enrollment of courses, rotation, and demand.	2
Comments:		

2.3	Course offerings appear appropriate for the needs of the program.	2
Comments:		
2.4	Discussion on curriculum changes based on assessment are clearly explained and complete	2
Comments:		
2.5	Course descriptions are detailed and specific. They reflect the levels of rigor identified by Curriculum Committee in their descriptions. (100-400 level)	2
Comments:		
2.6	Teaching effectiveness summary within the program is detailed and faculty respond to successes and deficiencies within the evaluation.	3
Comments:		
Physical, Human, and Financial Resources		
3.1	Summarizes all physical equipment needs and supplies noting any deficiencies and the impact on student learning.	2
Comments:		
3.2	Summarizes the physical space available to the program	2
Comments:		
3.3	Summarizes the Technology equipment needs and supplies noting any deficiencies and the impact on student learning.	2
Comments: the description of the technology could be more detailed to assist in explaining what is needed for the success of students at this level.		
3.4	Provides summary analysis of library holdings, noting specifically how deficiencies, if any, affect student learning	2
Comments:		
3.5	Faculty qualifications and specific competencies are fully and accurately described	3
Comments: the program does a good job of assigning adjunct faculty and covering the courses needed for the program.		
3.6	Provides a sound rationale for current staffing and/or future recommendations related to student learning.	1
Comments: the report indicated issues with staffing (administrative) however, this was not elaborated upon, and faculty overloads were also not addressed.		
3.7	Provides rationale and recommendations to improve resources that would address such deficiencies and link student learning.	2
Comments:		
3.8	Provides sound rationale on the financial aspects of the program. Reflects on the cost per major and fiscal needs of the program.	1
Comments: cost per major is not included in the report - this part of the report could have been more complete.		

Assessment		
4.1	Includes University learning outcomes and assessment measures, which are clearly explained.	3
Comments:		
4.2	Includes Program learning outcomes and assessment, which are clearly explained.	3
Comments:		
4.3	Standards for performance and gaps in student learning are clearly identified with action plans for improvement if needed.	3
Comments:		
4.4	The student learning objectives are appropriate for the specific discipline.	3
Comments:		
4.5	Includes a longitudinal view of assessment for each program learning outcome	3
Comments: The program provides a thorough examination of student assessment. The assessment is throughout the program. Using a pre and posttest with the MFT provides a value-added approach to what students are getting academically in the program.		
4.6	Discussion on the assessment process over the 5-year span.	3
Comments: The program provides clear and easy to follow assessments that span the 5-year cohort. Details are provided and data are explained for the reader.		
External Review		
5.1	Program response to all criteria marked as a 2 or lower on the External Review report is complete with specific strategies for improvement.	2
Comments:		
5.2	Response to the external review is complete and detailed	2
Comments:		
Conclusion		
6.1	Strengths of the program are discussed	3
Comments: the program provided a detailed response and articulated the strengths of the program effectively.		
6.2	Challenges of the program are discussed.	3
Comments:		
6.3	Action plan for the program is visionary, showing evidence that the program is aiming for a higher level of student learning.	3
Comments:		

Appendix:

William Woods University - Dulany Library
COLLECTION ANALYSIS

September 2020

In Support of the Following Academic Program: Biology

I. **MOBIUS Holdings** (Subject Search):

Biology – 31,114 catalog entries
Cytology – 3,005 catalog entries
Evolution – 16,536 catalog entries
Genetics – 14,990 catalog entries
Human anatomy – 4,094 catalog entries
Invertebrates – 1,408 catalog entries
Microbiology – 7,164 catalog entries
Molecular biology – 4,606 catalog entries
Physiology – 27,246 catalog entries
Vertebrates – 1,389 catalog entries

II. **William Woods University Holdings**:

Ebooks:

Biology – 424 catalog entries
Cytology – 52 catalog entries
Evolution – 847 catalog entries
Genetics – 175 catalog entries
Human anatomy – 73 catalog entries
Invertebrates – 20 catalog entries
Microbiology – 123 catalog entries
Molecular biology – 90 catalog entries
Physiology – 289 catalog entries
Vertebrates – 38 catalog entries

Journals (Print and full-text):

Biology – 105 titles
Life science – 85 titles
Conservation biology – 65 titles
Botany – 30 titles

Zoology – 26 titles
Biochemistry – 17 titles
Genetics & Genomics – 17 titles
Microbiology – 11 titles
Molecular biology - 9 titles
Physiology – 9 titles

Streaming Video:

Biology – 402 catalog entries
Cytology – 25 catalog entries
Evolution – 276 catalog entries
Genetics – 246 catalog entries
Human anatomy – 213 catalog entries
Invertebrates – 0 catalog entries
Microbiology – 79 catalog entries
Molecular biology – 0 catalog entries
Physiology – 327 catalog entries
Vertebrates – 1 catalog entry

Printed Books, DVDs

By Publication Date

Subject	Totals	1850-1899	1900-1909	1910-1919	1920-1929	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2009	2010-2014	2015-2019	2020	Other
Biological Sciences Totals	1701	5	8	8	7	20	32	75	242	177	150	434	422	71	46	0	4
Animal Behavior, Anatomy, Embryology	104	0	0	1	0	1	3	6	28	17	8	18	17	3	2		0
Biology, General	249	2	1	2	0	3	2	15	54	21	15	54	67	7	6		0
Birds	100	1	0	1	0	2	0	0	16	7	10	18	28	11	6		0
Botany, General	103	0	1	0	1	3	6	8	16	5	12	23	22	3	3		0
Botany, Specific Fields	56	1	2	0	0	0	1	10	11	9	3	8	6	2	3		0
Chordates - Vertebrates	9	0	0	0	0	2	0	1	1	0	2	2	1	0	0		0
Cytology	51	0	0	0	0	0	2	1	15	2	2	4	19	1	5		0
Ecology	105	0	0	0	0	0	1	1	8	11	9	40	31	3	0		1

Subject	Totals	1850-1899	1900-1909	1910-1919	1920-1929	1930-1939	1940-1949	1950-1959	1960-1969	1970-1979	1980-1989	1990-1999	2000-2009	2010-2014	2015-2019	2020	Other
Fishes	23	0	0	0	0	0	0	1	1	3	3	9	6	0	0		0
Genetics	118	0	0	0	1	0	1	4	10	5	5	48	37	4	3		0
Invertebrates	122	0	1	0	1	2	3	6	17	21	9	32	24	5	1		0
Mammals	101	0	0	1	0	0	0	3	9	20	17	29	17	2	3		0
Microbiology	48	0	0	0	0	0	0	0	3	2	3	11	25	3	1		0
Microscopy	9	0	0	0	0	1	1	1	2	1	1	1	1	0	0		0
Natural History	242	1	3	1	2	2	4	5	24	25	26	72	59	13	5		0
Plant Anatomy	15	0	0	0	0	1	0	0	4	1	0	5	2	0	0		2
Plant Ecology	11	0	0	1	0	0	0	1	0	1	1	5	2	0	0		0
Plant Physiology	18	0	0	0	0	0	2	2	3	1	2	1	6	0	1		0
Reproduction & Life	36	0	0	0	0	0	0	0	3	2	2	11	16	2	0		0
Reptiles & Amphibians	46	0	0	0	1	1	2	4	4	6	3	8	13	2	2		0
Virology	11	0	0	0	0	0	0	0	1	0	0	2	5	3	0		0
Zoology, General	124	0	0	1	1	2	4	6	12	17	17	33	18	7	5		1

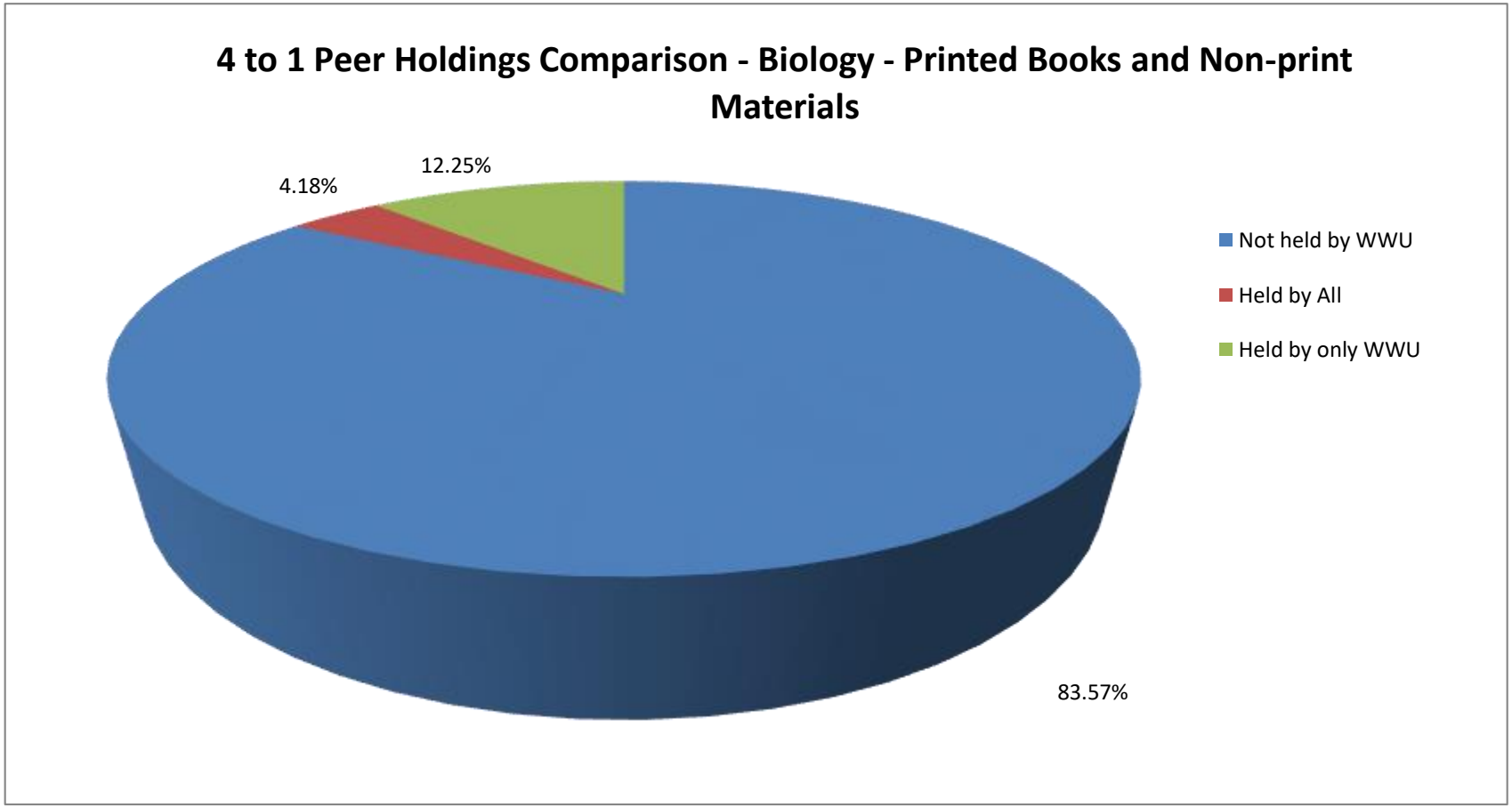
By Material Type

Subject	Totals	Books	Computer Files	Journals/Magazines	Videos
Biological Sciences Totals	1701	1330	4	329	37
Animal Behavior, Anatomy, Embryology	104	95	0	9	0
Biology, General	249	204	1	40	4
Birds	100	90	0	8	2
Botany, General	103	69	0	33	1
Botany, Specific Fields	56	48	0	8	0
Chordates - Vertebrates	9	9	0	0	0
Cytology	51	35	0	15	1
Ecology	105	68	2	27	7
Fishes	23	18	0	5	0

Subject	Totals	Books	Computer Files	Journals/Magazines	Videos
Genetics	118	94	0	23	1
Invertebrates	122	99	0	21	2
Mammals	101	91	0	7	3
Microbiology	48	25	0	22	1
Microscopy	9	9	0	0	0
Natural History	242	186	0	50	6
Plant Anatomy	15	10	1	4	0
Plant Ecology	11	5	0	4	2
Plant Physiology	18	8	0	7	3
Reproduction & Life	36	19	0	14	3
Reptiles & Amphibians	46	41	0	5	0
Virology	11	6	0	5	0
Zoology, General	124	101	0	22	1

III. Comparison with Peer Institutions (4 to 1 comparison)

Libraries Used for Comparison: Stephens College, Columbia College, Westminster College, Central Methodist University



IV. Analysis

Biology as a discipline taught at the undergraduate level generally requires up-to-date library materials. Both the print and non-print collections are fairly weak in all sub-disciplines of biology. However, instead of acquiring print materials in the biological sciences, the WWU Library has invested in digital materials, both monographic and serial. All resources are available through *Woods OneSearch.*

The Library currently does not have a database focused specifically on the biological sciences. However, the following databases are available:

Academic Search Ultimate - A collection of peer-reviewed, full-text journals, including many journals indexed in leading citation indexes. The combination of academic journals, magazines, periodicals, reports, books and videos meets the needs of scholars in virtually every discipline ranging from astronomy, anthropology, biomedicine, engineering, health, law and literacy to mathematics, pharmacology, women's studies, zoology and more.

Environment Complete - Offers deep coverage in applicable areas of agriculture, ecosystem ecology, energy, renewable energy sources, natural resources, marine & freshwater science, geography, pollution & waste management, environmental technology, environmental law, public policy, social impacts, urban planning, and more. The database contains full text for more than 680 journals, such as Environment (back to 1975), Ecologist, Conservation Biology, and more.

Primal Pictures: Anatomy.tv - Anatomy.tv from Primal Pictures is an interactive 3D human anatomy database built using real human scan data modeling all human structures, with the ability to rotate the model 360 degrees and add or remove layers of anatomy. Links include relevant text, dissections, clinical slides, diagrams, video clips and MRI scans.

PubMed - PubMed comprises more than 23 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full-text content from PubMed Central and publisher web sites.

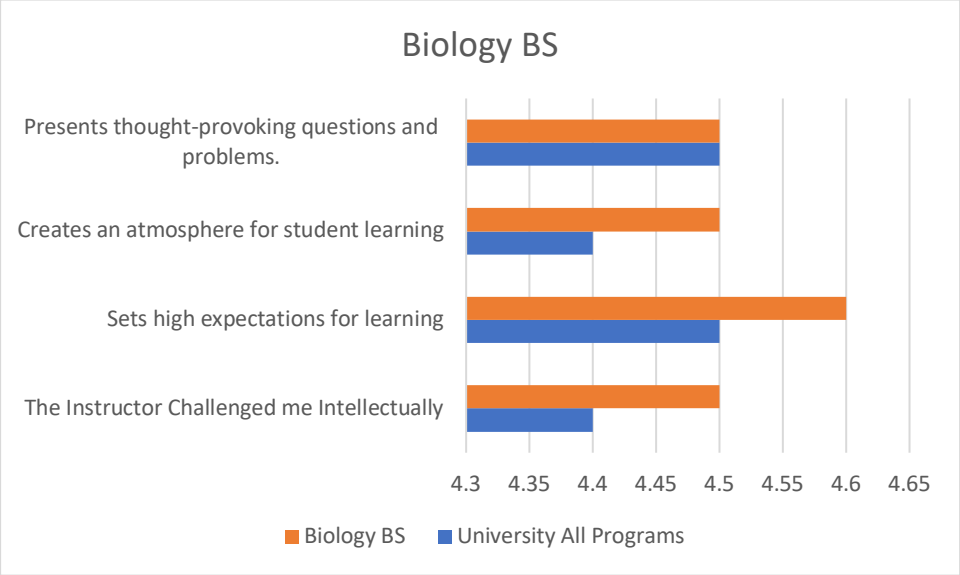
Science Reference Center – A comprehensive research database that provides easy access to a multitude of full text science-oriented content. This database contains full text for nearly 640 science encyclopedias, reference books, periodicals, etc. Topics covered include: biology, chemistry, earth & space science, environmental science, health & medicine, history of science, life science, physics, science society, science as inquiry, scientists, technology and wildlife.

The library staff acquires any resources that are not available in existing print and digital collections through interlibrary loan.

As in all other disciplines, WWU faculty and students have access to the resources available in MOBIUS member libraries, which includes the superb collections at the large research institutions in the state of Missouri, i.e., the four campuses of the University of Missouri, Washington University, Missouri State University and St. Louis University. Beginning in 2014, access to the resources of the academic, public and special libraries in Colorado and Wyoming became possible through Prospector, a resources sharing partner of MOBIUS. Prospector provides access to an additional 30 million books, journals, DVDs, CDs, videos and other materials, and includes the collections of the libraries at the campuses of the University of Colorado, Colorado State University, University of Denver, and the University of Wyoming. Resources selected from both MOBIUS and Prospector are delivered by courier, thereby reducing the delivery time.

Biology BS: Summary of Teaching Effectiveness

Course Evaluation Summary:



Sample:

N=1468 52.5% Response Rate

This data is representative of courses listed on the program checklist. Data from online courses represented in the program begin Academic year 2019-2020 after EOC alignment was created. This data represents end of course surveys from the 2017-2018 through 2019-2020 academic years.

Robin Hirsch-Jacobson

William Woods University
One University Avenue
Fulton, MO 65251
573.592.4315
Robin.HJ@WilliamWoods.edu

Education

2005-2011: PhD, Biological Sciences
University of Missouri, Columbia, MO
Dissertation title: Population dynamics of a migrant songbird: Do we need to monitor the entire breeding season?
Advisor: Dr. John Faaborg

1996-2001: Bachelor of Arts, Environmental Studies with Honors
Bachelor of Science, Marine Biology
University of California, Santa Cruz, CA

Work Experience

Assistant Professor of Biology, William Woods 2011 – present

University Committees and Service

Director of the School of Science and Health
Chair of the Honors Committee
Co-Lead of Strategic Planning Committee Priority 1
Served on the Institutional Review Board including time as chair
Advisory Council for Distance Education
Served and chaired multiple faculty search committees
Served on Curriculum Committee
Former Faculty Rep to Academic Council
Served on the Professional Development Committee
Served on HLC sub Criterion One Committee
Served on the Catalog Revision Committee
Served and chaired Personnel Committee
Served on the Enrollment Committee

Courses taught

BIO 115
BIO 124
BIO 125
BIO 200
BIO 209 (on ground and online)
BIO 317
BIO 318

BIO 330
BIO 331
BIO 333
BIO 334
BIO 350
BIO 400 (multiple versions)
BIO 401
BIO 409
BIO 418
BIO 430
BIO 431
BIO 450
SCI 230

Grants

TransWorld Airlines Scholarship ($7000)
Audubon Society of Missouri Graduate Research Scholarship ($2000)
Menke Scholarship for Wildlife Habitat ($1000)

Publications

Hirsch-Jacobson, R. and Faaborg, J. Population dynamics of a migrant songbird: Do we need to monitor the entire breeding season?

Hirsch-Jacobson, Robin, et al. "Parents or Predators: Examining Intraseasonal Variation in Nest Survival for a Migratory Passerine." The Condor 114.2 (2012): 358-364.

Technical Reports and others

Hawkins, A. and Hirsch-Jacobson, R. (in prep). Puerto Rican Screech-Owl (*Megascops nudipes*), Neotropical Birds Online (T. S. Schulenberg, Editor). Ithaca: Cornell Lab of Ornithology

Hirsch-Jacobson, R. 2008. Status report from the 2006 ASM Graduate Research Scholarship recipient. Bluebird 74 (2): 53-57.

Reynolds, M., et al. 2008. Reproductive success of oak woodland birds in Sonoma and Napa counties, California. 443-445 *in* Merenlender, A., McCreary, D., Purcell, K. L., tech. eds. 2008. Proceedings of the sixth California oak symposium: today's challenges, tomorrow's opportunities. Gen. Tech. Rep. PSW-GTR-217. Albany, CA: U.S.Department of Agriculture, Forest Service, Pacific Southwest Research Station. 677 p.

Hirsch-Jacobson, R. 2003. Quercus and aves. Observer 133.

Lockwood J. L., Hirsch-Jacobson, R., Caudill, J. M., and Paxson, K. 1999. The 1999 Breeding Season Report for the Cape Sable Seaside Sparrow. Chapter 4 *in* S. L. Pimm. 1999. The 1999 Annual Report.

Lockwood J. L., Fenn, K. H., Warren, T., Hirsch-Jacobson, R., Van Holt A., and Fargue, A. 1999. Defining nest site microhabitats and preferences to aid in the recovery of the Cape Sable Seaside Sparrow. Chapter 6 *in* S. L. Pimm. 1999. The 1999 Annual Report.

Presentations

Oral presentations

Hirsch-Jacobson, R. Parents or predators: Examining intraseasonal variation in nest survival for a migratory passerine AOU Meeting. July 2011

Hirsch-Jacobson, R. Are Forest Fragments Population Sinks for Migrant Forest Birds? Audubon Society of Missouri Annual Meeting. September, 2008.

Hirsch-Jacobson, R. Forest fragments may not be severe sinks for migrant birds. Webster Grove Nature Study Society Meeting. May, 2007.

Posters (names in bold indicate an undergraduate author)

Hirsch-Jacobson, R. Using an individual-based model to predict annual fecundity of the Acadian Flycatcher. AOU/COS/SCO 2010 Meeting. February, 2010.
Tewes, E. E., Hirsch–Jacobson, R., Cox, W. A., and Faaborg, J. Investigating seasonal fluctuations in nest success of the Acadian Flycatcher (*Empidonax virescens*). AOU/COS/SCO 2010 Meeting. February, 2010.

Hirsch-Jacobson, R., and J. R. Faaborg. Missouri forest fragments might not be population sinks for some migrant forest birds. AOU 2009 Meeting. August,2009.

Landeros, R., and R. Hirsch-Jacobson. Seasonal variation in breeding Acadian Flycatcher call rates. 2009. Summer Undergraduate Research and Creative Achievements Forum. August, 2009.

Hirsch-Jacobson, R., and J. R. Faaborg. Are fragmented forests population sinks for Migratory Birds? 2007 Whitney and Anna Harris Conservation Forum, November 2007.

Professional Service

Journal Reviews: The Auk, Canadian Journal of Zoology, Conservation Biology, International Journal of Biodiversity and Conservation, and Zoological Studies.

Community Affiliations

On the Conservation Committee for Greenbelt Land Trust of Mid-Missouri

Active member of Missouri Prairie Foundation, PedNet, Missouri Rural Crisis Center, Mount Tamalpais College, Central Missouri Human Society

Sarah Greenland-White, Ph.D.

EDUCATION

- **Ph.D. Neuroscience,** University of California, Davis California. 2017
- **B.S.** *cum laude* **Neuroscience**, Brigham Young University, Provo, Utah. 2012.

TEACHING EXPERIENCE

2017-present

William Woods University—Assistant Professor of Biology

- General Biology and lab
- General Biology II lab
- Anatomy and Physiology I and lab
- Anatomy and Physiology II and lab
- Comparative Vertebrate Anatomy and Physiology and lab
- Pathophysiology (Human Diseases)*
- Neuroscience*
- Cell and Molecular Biology
- What is Life

**new courses I have designed and have added to the course catalogue*

2013-2017

University of California-Davis—Associate Instructor

- Foundations for University Success 2016-2017

University of California-Davis Research mentor to undergraduate students

- Schizophrenia and Memory, 2014-2016

University of California-Davis Teaching assistant 2013-2015

- Research Methods in Psychology
- American Culture and the University Experience

2009

Brigham Young University—Teaching Assistant

- General Psychology

RESEARCH EXPERIENCE

2019-2020 William Woods University Cox Research Grant recipient,
The Cognitive Impact of Plants
Examined the cognitive impact of interacting with plants on measures of performance, memory, and mood

This project allowed me to mentor three undergraduate researchers and give them experience in computer programing, experimental design, research practice, and data analysis. This project also involved 26 undergraduate research participants.

2012-2017 University of California Davis Neuroscience Researcher
Translational Cognitive and Affective Neuroscience lab, J. Daniel Ragland Research Group 2013-2017
Evaluated the neuroanatomical basis of relational memory impairments in individuals with schizophrenia and those at ultra-high-risk for psychosis

College of Biological Science, Nervous System Development Lab, Elva Diaz Research Group 2013
Investigated the expression of SynDIG4 a previously uncharacterized neural molecule

College of Psychology, Optogenetics Memory Lab, Brian Wiltgen Research Group

Piloted a behavioral memory task in mice and examined the neuroanatomy of mice.

2008-2012 Brigham Young University Research Assistant

BYU Autism Lab, Mikle South Research Group January 2008-December 2009, September 2011-April 2012.
Designed and performed fMRI and behavioral studies of anxiety in autism

BYU Addiction Lab, Dr. Scott Steffensen May 2009-December 2009, October 2011-April 2012.
Analyzed addiction data and designed behavioral experiments

SERVICE

William Woods University

- 2021-present Curriculum Committee
- 2019-present Institutional Review Board
- 2020-present Faculty Co-Sponsor for the Pre-Med Club
- 2019-search committee for chemistry faculty
- 2018-search committee for physics faculty

UC Davis

- 2014-2015 served as graduate Student member of the UC Davis Neuroscience Curriculum Committee

- 2015-2016 UC Davis outreach programs including *Neuroscience Initiative to Enhance Diversity, Brain Awareness weeks* and host for reception for incoming international graduate students

PUBLICATIONS and PRESENTATIONS

- Greenland-White S.E., Crooks M., and Daniels A., (2021)
  The Cognitive Impact of Plants Virtual Presentation Presented to William Woods University, Fulton Missouri.

- Greenland-White S.E., and Gen Bio 1 Students (2018)
  Illusions, STEAM Night Presentation for Elementary School Students, Fulton Missouri.

- Greenland-White S.E., Niendam T.A., Ferrer E., Carter C.S., Ragland J.D (2017). *Episodic memory functions in first episode psychosis and clinical high risk individuals*. Schizophr Res. 2017 Oct;188:151-157

- Greenland-White S.E., Niendam T.A., Ferrer E., Lesh, T., Solomon, M., Carter C.S., Ragland J.D. *Atypical memory structure related to recollective ability.* (2017). Poster presented at the 16th International Congress on Schizophrenia Research, San Diego California.

- Ragland, J.D., Hsieh, L.T., Lam, J., White, S., Carter, C.S., Lesh, T., Niendam, T.A., Ranganath, C. (December 2016). *Task specific disruptions in theta oscillations during working memory in people with schizophrenia.* Poster presented to the American College of Neuropsychopharmacology, Hollywood, Florida.

- Ragland, J.D., White, S.E., Niendam, T.A., Ferrar, E., Carter, C.S. (April 2016). *Relational and item specific memory markers of psychosis risk.* Talk presented to the 5th Biennial Schizophrenia International Research Society Conference, Florence, Italy.

- White, S.E., Carter, C.S., Ragland, J.D. (August, 2015). *Anatomical differences in brain regions associated with relational memory in schizophrenia.* Poster presented to the Bay Area Memory Meeting, Davis, California.

- White, S.E., Niendam, T.A., Maruyama, B., Lesh, T., Yoon, J., Solomon, M., Carter C.S., Ragland, J.D. (May, 2014). *Performance on the relational and item specific memory encoding task in individuals at clinical high risk for psychosis.* Poster presented to the Annual Meeting of the Society for Biological Psychiatry, New York, New York.

- Chamberlain P.D., Rodgers J., Crowley M.J., White S.E., Freeston M.H., South M. (2013). *A potentiated startle study of uncertainty and contextual anxiety in adolescents diagnosed with autism spectrum disorder*. Molecular Autism, 4;4(1):31.

- White, S.E., Ernst, W., Worsham, W.A., South, M. (May, 2012). *Emotional conflict adaptation in autism.* Poster presented to the International Meeting for Autism Research, Toronto, Canada.

- Chamberlain, P.D., Newton, T., Ernst, W., White, S.E., Nelson, K., Schuck, D., South, M. (May, 2012). *Behavioral and somatic responses to decision making in autism spectrum disorders: evidence from the Iowa Gambling Test.* Poster presented to the International Meeting for Autism Research, Toronto, Canada.

- South, M., Larson, M.J., Clayson, P.E., White, S.E. (May, 2012). *Intact interhemispheric transmission in children and adolescents diagnosed with An ASD.* Poster presented to the International Meeting for Autism Research, Toronto, Canada.

- South, M., Larson, M.J., White, S.E., Dana, J., & Crowley, M.J. (2011). *Better fear conditioning is associated with reduced symptom severity in Autism Spectrum Disorders*. Autism Research, 4(6), 412-421.

- South, M., Dana, J., White, S.E., & Crowley, M.J. (2011). *Failure is not an option: risk-taking is moderated by anxiety and also by cognitive ability in children and adolescents diagnosed with an Autism Spectrum Disorder*. Journal of Autism and Developmental Disorders, 41, 55-65.

- White, S.E., Chamberlain, P.D., Newton, T., Ernst, W., Schmuck, D., & South, M. (October, 2011). *Rational vs. emotional decision making in Autism: evidence from the Iowa Gambling Test*. Poster presented at the Neuroscience Snowbird Symposium, Salt Lake City, Utah.

- Newton, T., Ernst, W., Chamberlain, P.D., White, S.E., Nelson, K., & South, M. (October, 2011). *Having a hard time with change? Reversal learning in Autism*. Poster presented at the Neuroscience Snowbird Symposium, Salt Lake City, Utah.

- Johnston, O., White, S.E., Clawson, A., Krauskopf, E., Larson, M. J., & South, M. (May, 2010*). Social versus memory demands on cognitive set shifting.* Poster presented to the International Meeting for Autism Research, Philadelphia, PA.

- Dana, J., Cariello, A., & South, M. (May, 2009). *Angry faces lead to less facilitation of conditioned learning in high-functioning ASD than in comparison groups*. Poster presented to the International Meeting for Autism Research, Chicago, IL.

- Dana, J., White, S.E., Cariello, A., & South, M. (May, 2009). *Behavioral regulation and risk taking in high-functioning Autism*. Poster presented to the International Meeting for Autism Research, Chicago, IL.

- Cariello, A., Southwick, J., White, S.E., Dana, J., Baldwin, S.A., Stephens, S., Johnson, C., & South, M. (May, 2009). *Measuring treatment outcome in Autism preschools*. Poster presented to the International Meeting for Autism Research, Chicago, IL.

CURRICULUM VITAE

Kimberly L. Keller

CONTACT INFORMATION:

Work Phone: 573-592-1637

Cox Science and Language 205

EDUCATION:

INSTITUTION AND LOCATION	DEGREE	YEAR	FIELD OF STUDY
Bowling Green State University, Bowling Green, Ohio	Ph.D.	2006	Biological Sciences **Dissertation Title:** *The TonB and TolA transmembrane domains: Contributions of non-essential side-chains to energy transfer.*
Bowling Green State University, Bowling Green, Ohio	M.S.	2000	Biological Sciences **Thesis Title:** *A Study of the Roles of the RecB & RecO Proteins in the Induction of SOS & in DNA Repair in Escherichia coli*
Wilmington College of Ohio, Wilmington, Ohio	B.S.	1993	Major: Biology Minor: Chemistry

EMPLOYMENT:

2018 – Current	**Associate Professor of Biology** Clark Cox Distinguished Professor in Science, 2018 – 2019 Academic year William Woods University – Fulton, Missouri
2013 – 2018	**Assistant Professor of Biology** Clark Cox Distinguished Professor in Science, 2017 – 2018 Academic year William Woods University – Fulton, Missouri
Fall 2012	**Visiting Instructor** ~ Biology Department William Woods University – Fulton, Missouri
2006 – 2012	**Post-Doctoral Research in Sulfate-Reducing Bacteria ~** J. D. Wall Laboratory Biochemistry Department, University of Missouri - Columbia, Missouri

2005 – 2006	**Graduate Research Assistant** ~ Biology Department Bowling Green State University – Bowling Green, Ohio (PI: Dr. R. A. Larsen)
2003 – 2005	**NSF GK-12 Fellow** ~ Biology Department Bowling Green State University – Bowling Green, Ohio NSF Grant: *PRISM* (Partnership for Reform through Inquiry in Science & Math) (PI: Dr. S. J. Van Hook and Dr. L. Ballone-Duran)
2001 – 2003	**Teaching Assistant for Environment of Life Laboratory** ~ Biology Department Bowling Green State University – Bowling Green, Ohio
2000 – 2001	**Graduate Teaching Assistant/Master Teacher** ~ Biology Department Bowling Green State University – Bowling Green, Ohio NSF Grant: Infrastructure for Inquiry (PI: Dr. C. Waggoner and Dr. J. McArthur)
1998 – 2000	**Teaching Assistant for Introduction to Biology** ~ Biology Department Bowling Green State University – Bowling Green, Ohio
1993 – 1998	**Toxicology Research** ~ Life Science Division Charles River Laboratory (Springborn Laboratory, Incorporated) Spencerville, Ohio Team Manager and Laboratory Technician

TEACHING EXPERIENCE:

BIOLOGY DEPARTMENT – WILLIAM WOODS UNIVERSITY

Louis D. Beaumont Dad's Association Distinguished Professor Award for Excellence in Teaching (2020)
The award carries an honorarium and is presented annually to a faculty member who has displayed an outstanding dedication to teaching. Recipients of the award are nominated and chosen by students.

Associate Professor of Biology – (Spring 2018 – Current)
I am responsible for two of the core courses in our Biology programs, **Genetics,** which is taught every fall, and Biology Practicum, taught every spring, both are required for all biology majors (both B.A. and B.S.). In addition, yearly I teach **Microbiology** and **Biochemistry**, both required by our B.S. Pre-Vet concentration students, as well as teaching the upper division elective courses that are molecular or microbial-based, one general education course every spring, as well as other laboratory courses as needed. I have developed three new upper-level biology courses; including a new upper-level Genetic course (BIO351 Molecular Genetics: Cancer Biology) for Fall 2021. In addition, every year I work to update and modify my other courses to ensure that our students are getting the most current material from those fields.

BIO231/232 Genetics with Laboratory
BIO303/304 Microbiology with Laboratory
BIO450 Biology Practicum
CHM440/441 Biochemistry with Laboratory
BIO421 Biology Laboratory Assistant
BIO224 Contemporary Topics in Biology - N
BIO405/406 Cell & Molecular Biology with Laboratory
BIO414/415 Molecular Biotechnology with Laboratory
BIO400/400L Microbial Diseases in the Humans
BIO351 Molecular Genetics: Cancer Biology
BIO115 General Biology I Laboratory - N
BIO125 General Biology II Laboratory - N
BIO318 Comparative Vertebrate Laboratory

Assistant Professor of Biology – (Spring 2013 – 2018)
Responsible for two of the core courses in our Biology programs, **Genetics,** which is taught every fall, and Biology Practicum, taught every spring, both are required for all biology majors (both B.A. and B.S.). In addition, yearly I teach **Microbiology** and **Biochemistry**, both required by our B.S. Pre-Vet concentration students, as well as teaching other upper division elective courses that are molecular or microbial-based, one general education course, as well as other laboratory courses as needed.

Visiting Instructor – (Fall 2012)
I was responsible for teaching the lecture and laboratory components of two upper division courses, Genetics and BIO400 Molecular Biotechnology for the department. The **Genetics** course emphasized current developments and techniques in the study of inheritance including extensions and applications of transmission, population, and molecular genetics. The laboratory course involved Mendelian experiments as well as those experiments introducing cell-molecular genetics techniques. The **Molecular Biotechnology** course examined the use of living systems and organisms to develop useful products. This course provides an introduction to biotechnology theories and techniques essential to laboratory research in agricultural, environmental or medical biotechnology such as laboratory safety and records keeping, genome informatics, DNA analysis, RNA analysis, protein analysis and analysis of biological systems. The laboratory course involved a collaborative research project with the University of Missouri in which William Woods University students constructed the cloning vectors that were to be used to generate deletion mutants in the environmentally important sulfate-reducing bacterium *Desulfovibrio vulgaris* Hildenborough.

BIOCHEMISTRY DEPARTMENT – UNIVERSITY OF MISSOURI
Guest Lecturer – Biochemistry (Fall 2009, Fall 2011) A required course for biochemistry majors, for juniors and seniors, the second semester of a comprehensive biochemistry course, including metabolism of carbohydrates, fatty acids, steroids, amino acid synthesis and metabolism, molecular genetics, hormones, photosynthesis and integrated metabolism. The material for the guest lectures included explanation of carbon utilization from amino acids and photosynthesis.

BOWLING GREEN STATE UNIVERSITY
NSF GK-12 Fellow (Fall 2003 – Spring 2005)
NSF Grant: *PRISM* (Partnership for Reform through Inquiry in Science & Math)
(PI: Dr. Stephen J. Van Hook and Dr. Lena Ballone-Duran)
Graduate students were partnered with K-12 teachers as a content/inquiry resource for school districts as they aligned their curriculum with National/Ohio Content Standards in Science/Math in order to improve student learning of math and science through inquiry-based instruction. I worked collaboratively with science faculty for one year at Eastwood Middle School and one year at Bowling Green High School to develop and redesign multiple courses.

Graduate Teaching Assistantship/Master Teacher (Fall 2000 – Spring 2001)
NSF Grant: Infrastructure for Inquiry
(PI: Dr. Charlene Waggoner and Dr. Julia McArthur)
I worked in a collaborative team to develop inquiry-based curricula for the non-major general biology laboratory course. The course was a requirement for pre-service early and middle childhood teachers. I was directly responsible for training other teaching assistants in the inquiry-based method of teaching. In addition, I taught one section as part of the Partners in Context and Community (PCC), a learning community for freshmen who had declared a middle childhood education major.

BIOLOGICAL SCIENCE DEPARTMENT - BOWLING GREEN STATE UNIVERSITY

Teaching Assistant for Environment of Life Laboratory – (Fall 2000 – Spring 2003) I taught multiple laboratory sections each semester of the introductory, non-major, environmental biology course. Basic concepts included: ecology and current environmental problems of air, water and land pollution; human reproduction and population dynamics.

Teaching Assistant for Introduction to Biology Laboratory – (Fall 1998 – Spring 2000) I taught multiple laboratory sections each semester of the introductory, non-major, molecular-based biology course. Basic concepts included: the cell, metabolism, genetics, reproduction, development, evolution, and ecology.

ENGAGEMENT OF UNDERGRADUATES IN RESEARCH AT WILLIAM WOODS UNIVERSITY:

Honors Research Project (2021 – Current)
Conrad Hansel – The Effect of Hand Sanitizer Chemicals on P1 Phage Infection of *Escherichia coli*

Honors Research Project (2020 – 2021 academic year)
Kate Doerhoff – Effectiveness of Antibacterial Products Against Pathogens and The Transmittance of Microbes

Honors Research Project (2020 – 2021 academic year)
Kylie Zamboni-Cutter – The Effect of Cannabidiol (CBD) on the Metastasis and Apoptosis of Pancreatic Cancer Cells (PANC-1)

Honors Research Project (2019 – 2020 academic year)
Ryan Esterline – Development of an On-Campus Protocol to Screen Horses for Strangles (*Streptococcus equi equi*)

Honors Research Project (2018 – 2019 academic year)
Daryl Parungao and Alexis Armontrout – Interleukin-1 Receptor Antagonist Protein (IRAP) as a Treatment in Osteoarthritic Horses. They presented on their research during Senior Showcase.

Honors Research Project (2018 – 2019 academic year)
Kelsey Moreland – Parasite Resistance Research, a survey of all the new horses and the colts received on campus since April of 2018. She presented on her research during Senior Showcase.

Clark Cox Distinguished Professor in Science Research Project (2018 – 2019 academic year)
The Cox Distinguished Professor in Science Project is paid release time from teaching in order to perform research with student mentees, which are given a stipend for their hard work and efforts. This Cox Research Project is a collaboration with Dr. Robert Kutz, Assistant Professor of Chemistry.
Title: *Stinson Creek – An Impaired Waterway*: A Collaborative Research Study Testing for the Presence of Escherichia coli and Organic Pollutants along the Small Impaired section of Stinson Creek in Calloway County.

- **Jamie Porter** – Lead Field Investigator and will work closely with Dr. Keller coordinating with the City of Fulton for access to areas of Stinson Creek and for collecting samples and running the microbial experiments of the project. In addition, Jamie presented our research finding to the City of Fulton including the Mayor, a City Council member, the City Manager, and other employees of the City of Fulton.
- **Karis Holm** – Lead Chemistry Investigator and will work closely with Dr. Kutz in the upkeep of GC-MS, coordinating the Dialysis and GCP Cleanup, running of the organic pollutant water samples on the GC-MS.

Clark Cox Distinguished Professor in Science Research Project (2017 – 2018 academic year)
Title: *Prevalence of Resistance in Microorganisms Testing the Presence of Resistance Genes in Oral Microbiomes and Equine Parasites*.
The Cox Distinguished Professor in Science Project is paid release time from teaching in order to perform research with student mentees, which are given a stipend for their hard work and efforts. This Cox Research Project is divided into two separate projects.

- **Lance Leverenz –** Research involves testing for the presence of tetracycline resistance genes (*tetA* and *tetR*) in the Oral Microbiomes of William Wood University students. The research involves isolating gDNA from salvia samples of students and then using PCR techniques to determine the presence of the *tetA* and *tetR* genes.
- **Rebecca Smith** and **Emily Tichy** – Research involves performing fecal eggs counts on the ~150 horses from William Woods an then perform two week rechecks on any horse that tested positive and was treated with deworming medications. The goal is to attempt identify any horses on campus that appear to be infested with Strongyle resistance parasites.

Phil Kulpinski (Fall 2017 - Current) Research is a collaborative effort with the City of Fulton to help collect data about organic pollutants using the GC/MS and to test for Escherichia coli contamination in a waterway, Stinson Creek, which runs through the city. Stinson Creek has been classified as an impaired (that is, pollution-damaged) waterway d by the Missouri Depart of Natural Resources to have issues. Stinson Creek's classification as an impaired (that is, pollutiondamaged) waterway by the Department of Natural Resources.

Research incorporated into BIO232 Genetics Laboratory (2013 – 2019)
A yearly collaborative plant genotyping with Dr. Antje Heese at the University of Missouri, Biochemistry Department. All together the project takes approximately 4 weeks of the laboratory class time in Genetics, but the students learn several molecular genetic techniques (such as micro-pipetting, gDNA isolation, PCR, and gel electrophoresis) in the process and this project truly connects the real-life use of probability and double-crosses to the information we discussed in lecture. Unfortunately, the COVID pandemic has not allowed this project the last two years.

Lance Leverenz and Phil Kulpinski (Summer 2017) Research was a continuation of the GEP projected started in the spring. These students completed gene annotations that were not finished during the semester and corrected some annotation that did not pass the quality controls.

Anna Blecha, Alaina Buff, Cassandra Dunn, Tessa Hance, and **Madelyn McMahill** (Spring 2017 – BIO415 students) Research was part of a larger collaboration with the Genomics Education Partnership (GEP). GEP is a collaborative between a growing number of primarily undergraduate institutions, and the Biology Department and the McDonnell Genome Institute of Washington University in St. Louis. The goal of GEP is to provide opportunities for undergraduate students to participate in genomics research. These participating undergraduate students learned to take raw sequence data to high quality finished sequence, and to annotate genes and other features, leading to analysis of a question in genomics and research publication.

Alexis Bailey and **Alaina Buff** (Spring 2017) Research involved isolating gDNA from oral microbiomes and then using PCR to study the prevalence of tetracycline resistance genes in a population of William Woods University students.

Alaina Buff and Madelyn McMahill (Fall 2016 – Spring 2017) Research involved the establishment and execution of laboratory standard operating procedures for purifying Platet-Rich Plasma (PRP) from equine blood samples using aseptic techniques. Research goal was to generate PRP that was uncontaminated that could be introduced back into the horse as trewatment.

Madelyn McMahill (Fall 2016 – Spring 2017) Research involved performing fecal eggs counts on the 157 horses each semester and performing two week rechecks on any horse that tested positive and was treated with deworming medications.

Joanie Ryan (Fall 2015) Research involved gaining practical experience in advanced laboratory research competencies such as initiation and maintenance of microbial cultures, establishment and execution of laboratory standard operating procedures (SOP), quality testing and validation of complex assays that are not directly part of but support the typical undergraduate curriculum.

Sarah McRae (Fall 2014) Research involved purification and preparing freezer stock of various bacterial cultures used in microbiology lab course.

Joanie Ryan (Fall 2014) Integrated primary scientific literature into a focused, cogent research agenda to apply Microbiology approaches to her Vertebrate Zoology lab independent project. Her project involved determining the prevalence of *E. coli* present in the feces of various Canada geese populations.

Cristina Christianson (Fall 2013 – Spring 2014): Research involved preparation and maintenance of various bacterial and eukaryotic cultures used in many of our courses.

Sheridan Roe (Fall 2013) Independent Study Titled: Development of Growth Protocols for *Desulfovibrio* strains and Metabolite Determination on the New Gas Chromatograph-Mass Spectrometer at William Woods University.

EDUCATION PUBLICATIONS:

Waggoner, C., M. Schaffner, **K. L. Keller**, J. McArthur. 2004. Chapter 23: Models of Reform in Teaching in the Biological Sciences, D. W. Sunal, E. Wright (Eds.), Research in Science Education: Reform in Undergraduate Science Teaching for the 21st Century, Information Age Publishing Inc., 2004.

Waggoner, C., **K. L. Keller** , and J. McArthur. 2002. *Studying Biodiversity: Joe's Jungle and the Hidden Jungle*, Tested Studies in Laboratory Education – Proceedings of the 24th Annual Association for Biology Laboratory Education Conference, Baton Rouge, Louisiana, June 2002. (http://www.zoo.utoronto.ca/able/volumes/vol-24/1-waggoner.pdf)

Keller, K. L., C. Tracy, and C. Waggoner. 2002. *Inquiring about the Environment: A service Learning Project,* Tested Studies in Laboratory Education – Proceedings of the 24th Annual Association for Biology Laboratory Education Conference, Baton Rouge, Louisiana, June 2002. (http://www.zoo.utoronto.ca/able/volumes/vol-24/4-keller.pdf)

Waggoner, C., **K. L. Keller,** and J. McArthur. 2001. *Infrastructure for Inquiry: Assessing Inquiry in Science Labs*, Tested Studies in Laboratory Education – Proceedings of the 23rd Annual Association for Biology Laboratory Education Conference, Chicago, Illinois, June 2001.

Assisted in Revision of Biology 101 Laboratory Manual by working collaboratively with Dr. Charlene Waggoner, December 2000 and May 2001.

Assisted in Revision of Biology 104 Laboratory Manual by working collaboratively with Dr. Charlene Waggoner and Dr. Betsy Clark. May 2000.

EDUCATIONAL WORKSHOPS & PRESENTATIONS:

Presenter of Major Workshop: "Studying Biodiversity: Joe's Jungle and the Hidden Jungle" Association for Biological Laboratory Education (ABLE) Meeting, Baton Rouge, Louisiana, June 2002.

Co-Presenter with Charlene Waggoner to the Partners in Context and Community Learning Community Lunchbox Series, Bowling Green State University, November 2001.

"Summer Institute for Partners in Community and Contextual Learning" Provided instruction for teaching context in the classroom and to establish community contacts, July 2001

Co-Presenter with Dr. Charlene Waggoner of Mini Workshop: "Assessing Inquiry in Science Labs" Association for Biological Laboratory Education (ABLE) Meeting, Chicago, Illinois, June 2001.

Co-Presenter with Dr. Charlene Waggoner: "Infrastructure for Inquiry - How to Teach Inquiry in Science Labs" University of Wisconsin Women in Science Spring Retreat, Wisconsin Dells, Wisconsin, May 2001.

Presenter for Bowling Green State University's Women in Science, Math, Engineering and Technology Program for area junior high school female students, Fall 2000, 2001, 2002; and area high school female students, Spring 2001.

Presented "Teaching a Science Lab for the First Time" during Bowling Green State University GradSTEP, August 2000

Presented "Handling Conflicts in the Classroom" during Bowling Green State University Biology Department GradSTEP, August 2000.

Whittier Elementary School Fifth Grade Science Guest Presenter, Lima, Ohio, Spring 1999.

RESEARCH EXPERIENCE:

Visiting Research Scholar ~ in the laboratory of J. D. Wall (June – July 2013)
Biochemistry Department, University of Missouri - Columbia, Missouri
I continued research from my post-doctoral work of analyzing energy-flow of various mutants of *Desulfovibrio alaskensis* G20 in response to different environmental stresses.

Post-Doctoral Research in Sulfate-Reducing Bacteria ~ J. D. Wall Laboratory (2006 – 2012)
Biochemistry Department, University of Missouri - Columbia, Missouri
I performed research on the genetics of environmentally important sulfate-reducing bacteria of the genus *Desulfovibrio* in order to study metabolism. My research included transcriptomic, proteomic, and metabolomic analyses, energy-flow and regulatory element changes of *Desulfovibrio* in response to environmental stresses.

Doctoral Research in Transport/Membrane Energetics in Bacteria ~ R. Larsen Laboratory (2003 – 2006)
Dissertation Title: *The TonB and TolA transmembrane domains: Contributions of non-essential side-chains to energy transfer.* I studied the role of various amino acids within the transmembrane domain of the energy-transducers, TonB and TolA, to determine their role in their energy specification for the energy-harvesting ExbB/D and TolQ/R complexes in *Escherichia coli.*

Thesis Research in DNA Replication, Repair & Recombination ~ D. Beck Laboratory (1998 – 2003)
Thesis Title: *A Study of the Roles of the RecB & RecO Proteins in the Induction of SOS & in DNA Repair in Escherichia coli.* Using chemical and UV-induced damage, I studied the role of recombination proteins on the repair of inter- and intrastrand crosslinks in DNA of *Escherichia coli.*

Toxicology Research ~ Life Science Division (1993 – 1998)
Charles River Laboratory [Springborn Laboratory, Incorporated] Spencerville, Ohio
Team Manager and Laboratory Technician – I managed a team of technicians that conducted new product research in the Chronic department of the vivarium (on various animal species) in a contract laboratory for FDA and/or USDA testing.

RESEARCH PUBLICATIONS:

Wall, J.D, G. M. Zane, T.R. Juba, J.V. Kuehl, J. Ray, S.R. Chhabra, V.V. Trotter, M. Shatsky, K.B. DeLeón, **K.L. Keller**, K.S. Bender, G. Butland, A.P. Arkin, A.M. Deutschbauer (2021) Deletion Mutants, Archived Transposon Library, and Tagged Protein Constructs of the Model Sulfate-Reducing Bacterium *Desulfovibrio vulgaris* Hildenborough. Microbiol. Resour. Announc. 2021 Mar 18;10(11):e00072-21. doi: 10.1128/MRA.00072-21.

Lopatto, D., A. G. Rosenwald, J. R. DiAngelo, A. T. Hark, … **K.L. Keller** … W. Leung, L. K. Reed, S. C. R. Elgin (2020) Facilitating Growth through Frustration: Using Genomics Research in a Course-Based Undergraduate Research Experience. *J. Microbiol. Biol. Educ.* 2020 Feb 28;21(1):21.1.6. doi: 10.1128/jmbe.v21i1.2005. eCollection 2020

Marques, M.C., C. Tapia, O. Gutiérrez-Sanz, A.R. Ramos, **K.L. Keller,** J.D. Wall, A.L. De Lacey, P.M. Matias, and I.A.C. Pereira (2017) The direct role of selenocysteine in [NiFeSe] hydrogenase maturation and catalysis. *Nat Chem Biol.* 13(5):544-550.

Ramos, A.R., F.Grein, G.P.Oliveira, S.S.Venceslau, **K.L. Keller**, J.D.Wall, and I.A. Pereira (2015) The FlxABCD-HdrABC proteins correspond to a novel NADH dehydrogenase/heterodisulfide reductase widespread in anaerobic bacteria and involved in ethanol metabolism in *Desulfovibrio vulgaris* Hildenborough. *Environ. Microbiol.* **17**(7):2288-2305.
Ray, J., **K.L. Keller**, M. Catena, T.R. Juba, M. Zemla, L. Rajeev, B. Knierim, G.M. Zane, J.J. Robertson, M. Auer, J.D. Wall, and A.Mukhopadhyay (2014) Exploring the role of CheA3 in *Desulfovibrio vulgaris* Hildenborough motility. *Front. Microbiol.* 2014 Mar 6;5:77. doi: 10.3389/fmicb.2014.00077. eCollection 2014.

Keller, K.L., B.J. Rapp-Giles, E.S. Semkiw, I. Porat, S.D. Brown, and J.D. Wall. (2014) New model for electron flow for sulfate reduction in *Desulfovibrio alaskensis* G20. *Appl. Environ. Microbiol.* **80**(3):855-868. doi: 10.1128/AEM.02963-13. Epub ahead of print 2013. (Chosen by editors as a Spotlight article of importance for the issue)

Ramos, A. R, **K. L. Keller**, J. D. Wall, and I. A. C. Pereira. (2012) The membrane QmoABC complex interacts directly with the dissimilatory adenosine 5´-phosphosulfate reductase in sulfate reducing bacteria. *Front. Microbiol.* **3**:137. doi:10.3389/fmicb.2012.00137.

Chhabra, S. R., G. Butland, D. A. Elias, J.-M. Chandonia, O.-Y. Fok, T. R. Juba, A. Gorur, S. Allen, C. M. Leung, **K. L. Keller**, S. Reveco, G. M. Zane, E. Semkiw, R. Prathapam, B. Gold, M. Singer, M. Ouellet, E. D. Szakal, D. Jorgens, M. N. Price, H. E. Witkowska, H. R. Beller, A. P. Arkin, T. C. Hazen, M. D. Biggin, M. Auer, J. D. Wall, and J. D. Keasling. (2011) Generalized Schemes for High-Throughput Manipulation of the *Desulfovibrio vulgaris* Genome. *Appl. Environ. Microbiol*. **77**:7595-7604.

Hauser, L. J., M. L. Land, S. D. Brown, F. Larimer, **K. L. Keller**, B. J. Rapp-Giles , M. N. Price, M. Lin, D. C. Bruce, J. C. Detter, R. Tapia, C. S. Han, L. A. Goodwin, J-F. Cheng, S. Pitluck, A. Copeland, S. Lucas, M. Nolan, A. L. Lapidus, A. V. Palumbo, and J. D. Wall. (2011) The Complete Genome Sequence and Updated Annotation of *Desulfovibrio alaskensis* G20. *J Bacteriol.* **191**:4268–4269.

Keller, K. L., J. D. Wall, and S. Chhabra (2011) Methods for engineering sulfate reducing bacteria of the genus *Desulfovibrio*. *Methods Enzymol*. **497:**503-517.

Keller, K. L., and J. D. Wall. (2011) Genetics and molecular biology of the electron flow for sulfate respiration in *Desulfovibrio*. *Front. Microbiol.* **2**:135. doi: 10.3389/fmicb.2011.00135.

Keller, K. L., K. S. Bender, and J.D. Wall. (2009) Development of a Markerless Genetic Exchange System in *Desulfovibrio vulgaris* Hildenborough and Its Use in Generating a Strain with Increased Transformation Efficiency. *Appl. Environ. Microbiol.* **75:**7682–7691.

Li, X., Q. Luo, N. Q. Wofford, **K. L. Keller,** M. J. McInerney, J. D. Wall, and L. R. Krumholz. (2009) A molybdopterin oxidoreductase is involved in H2 oxidation in Desulfovibrio desulfuricans G20. *J Bacteriol.* **191**:2675-2682.

Larsen, R. A., G. Deckert, K. Kastead, D. Surendranthan, **K. L. Keller,** and K. Postle (2007) His_{20} provides the sole functionally significant side chain in the essential TonB transmembrane domain. *J. Bacteriol.* **189:**2825-2833.

Keller, K.L., K. K. Brinkman, and R. A. Larsen. (2007) TonB/TolA amino-terminal domain modeling. *Methods Enzymol.* **423**:134-148.

Keller, K. L., T. L. Overbeck-Carrick, and D.J. Beck. (2001) Survival and induction of SOS in *Escherichia coli* treated with cisplatin, UV irradiation, or mitomycin C are dependent on the function of the RecBC and RecFOR pathways of homologous recombination. *Mutation Res*. **486**: 21-29.

REFEREED ABSTRACTS/CONFERENCE PROCEEDINGS – ORAL PRESENTATION:

Presented "Alternative Electron Pathways for Sulfate Respiration in *Desulfovibrio* Strains" at the America Society of Microbiology General Meeting as an invited Young Faculty in the Evolution of Bioenergetic Systems symposium on May 21, 2013 in Denver, CO.

REFEREED ABSTRACTS/CONFERENCE PROCEEDINGS - POSTERS:

Bailey, A., A. Buff, and **K.L. Keller** (2017) Prevalence of Tetracycline Resistance Genes in a Population of William Woods University Students. Annual Meeting, Missouri Academy of Science, Lindenwood University, St. Charles, Missouri.

Ramos, A. R., **K. L. Keller,** J. D. Wall, and I. A.C. Pereira (2012) Investigation of the physiological role of the QmoABC complex in Desulfovibrio spp. EMBO "Workshop on Microbial Sulfur Metabolism," Noordwijkerhout, Netherlands, April 2012.

Ramos, A. R., **K. L. Keller,** J. D. Wall, and I. A. C. Pereira (2011) Study of the physiological role of a conserved membrane-bound complex in SRB: The QmoABC complex**.** 7th European Workshop on Bacterial Respiratory Chains. Höör, Sweden.

Keller, K. L., B. J. Giles, A. Deutschbauer, J. Kuehl, A. Arkin, I. Porat, S. D. Brown, Judy D. Wall. (2010) Fumarate Dismutation in *Desulfovibrio* G20 and the Effect of Formate. Abstr. 110th Gen. Meet. Amer. Soc. Microbiol., [K-790].

Ray, J., K. L. Keller, J. D. Wall, J. Keasling, and A. Mukhopadhyay. (2010) CheA-3 is Essential for Chemotaxis Towards Electron Acceptors in *Desulfovibrio vulgaris* Hildenborough Abstr. 110th Gen. Meet. Amer. Soc. Microbiol., [Q-2846].

Keller, K. L., K. S. Bender, and J. D. Wall. (2009) A New Counterselectable Marker for *Desulfovibrio vulgaris*, the *upp* gene, Allowed for the Construction of a Markerless Deletion of a Type 1 Restriction Enzyme that Exhibits Increased Transformation Efficiency. Abstr. 109th Gen. Meet. Amer. Soc. Microbiol., [H-065].

Giles, B. J., **K. L. Keller**, A. Deutschbauer, J. Kuehl, A. Arkin, I. Porat, S. D. Brown, and J. D. Wall. (2009) Characterization of Fumarate Metabolism of *Desulfovibrio* G20 Using Proteomic Analysis and Tn5 Transposon Mutants. Abstr. 109th Gen. Meet. Amer. Soc. Microbiol., [K-080].

Li, X., Q. Luo, **K. L. Keller**, M. M. McInerney, J. D. Wall, and L. R. Krumholz. (2009) Identification of Genes Involved in H2 Oxidization in *Desulfovibrio desulfuricans* G20. Abstr. 109th Gen. Meet. Amer. Soc. Microbiol., [K-067].

Porat, I., **K. L. Keller**, B. J. Giles, S. D. Brown, and J. D. Wall. (2009) Transcript and Protein Expression Changes in a Type-1 Tetraheme Cytochrome c_3 Mutant of the Sulfate-Reducing Bacterium *Desulfovibrio* G20. Abstr. 109th Gen. Meet. Amer. Soc. Microbiol., [K-083].

Ray, J., E. Luning, A. Deutschbauer, **K. L. Keller**, J. Robertson, G. Zane, M. Price, S. Chhabra, J. Wall, A. Arkin, T. Hazen, J. Keasling, A. Mukhopadhyay. (2009) Study of Two-component Signal Transduction Systems in *Desulfovibrio vulgaris* Hildenborough. Abstr. 109th Gen. Meet. Amer. Soc. Microbiol., [Q-228].

Keller, K. L., B. J. Rapp-Giles, A. Deutschbauer, J. Kuehl, A. Arkin, and J. D. Wall. (2009) Using Pyruvate Fermentation to Determine the Flow of Electrons in Desulfovibrio. EMBO-FEMS Workshop on "Microbial Sulfur Metabolism," Tomar, Portugal. March 2009.

Keller, K. L., K. S. Bender, and Wall, J.D. 2008 The Development of an In-frame Deletion System in *Desulfovibrio vulgaris* Hildenborough. Abstr. 108th Gen. Meet. Amer. Soc. Microbiol., [H-132].

Keller, K. L. and J. D. Wall (2008) Developing In-frame/Markerless Deletion Techniques in *Desulfovibrio vulgaris* Hildenborough to study metabolic pathways. EC-US Workshop on "Metabolomics and Environmental Biotechnology," Mallorca, Spain, June 2008.

Larsen, R. A., G. E. Deckert, S. Devanathan, **K. L. Keller,** and K. Postle (2006) Minimal features of the TonB energization domain. Bacterial Cell Surfaces Gordon Research Conference, June 2006.

Keller, K. L., K. Postle, G. E. Deckert, and R. A. Larsen. (2005) Construction of a generic TonB/TolA transmembrane domain by multiple alanine replacement of non-essential residues. Abstr. 105th Gen. Meet. Amer. Soc. Microbiol.

Keller, K. L. and R. A. Larsen, (2005) Contributions of non-essential transmembrane domain residues to efficient energization of TonB protein. 114th Ohio Acad. Sci.

Keller, K. L. and D. J. Beck (2001) The Effects of Deficiencies in the RecBC and RecFOR Pathways on SOS Induction and *Escherichia coli* Cell Survival following Treatment with Cisplatin, Mitomycin C, and UV. Abstr. 101th Gen. Meet. Amer. Soc. Microbiol.

Keller, K. L., M. A. Donaho, and D. J. Beck. (2000) Comparative Genotoxicity in *Escherichia coli* Defective in Nucleotide Excision Repair or DNA Recombination. Midwest DNA Symposium, May 2000.

Keller, K. L., M. Donaho, and D. J.Beck. (2000) Comparative Genotoxicity of UV Irradiation, Mitomycin C, and Cisplatin in Wild-type and DNA Repair Defective Mutants of *Escherichia coli.* 109th Ohio Acad. Sci.

GRANTS/FUNDING:

Title: Dynamic EpsinR1-mediated vesicle networks in flg22-signaling and plant innate immunity against bacteria
Agency: National Science Foundation (NSF) IOS-Symbiosis, Defense, and Self-Recognition Program Grant Proposal submitted July 2015
Principal Investigator: Dr. Antje Heese (University of Missouri – Biochemistry Department) Listed as a collaborator

Title: Pathway of Fermentative Hydrogen Production by Sulfate-Reducing Bacteria
Agency: Department of Energy/ Office of Science Program Office: Biological and Environmental Research
Time Period: 2008 – 2012
Amount Awarded: $660,000
Role in Project: Co- Principal Investigator (Principal Investigator: Dr. Judy D. Wall)

WILLIAM WOODS UNIVERSITY SERVICE:

Assessment Committee (2017 – Current)
Beta Beta Beta Advisor (National Biological Honor Society) (2016 – Current)
Pre-Vet Club Advisor (Spring 2013 – Current)
Personell Committee (Fall 2017 – Current) Served as Chair during the 2020-2021 academic year
Search Committee for Chemistry Faculty (2017 – 2018) Served as Chair
Search Committee for Biology Faculty (2016 – 2017) Served as Chair
Pre-Med Club Advisor (Spring 2016 – 2021)
HLC Sub Criterion 3 Committee (2015 – 2016)
Search Committee for Biology Faculty (Summer 2016)
Curriculum Committee (Fall 2014 – 2017) Served as Chair during the 2015-2016 academic year
Search Committee for Hunter/Jumper Instructor (Spring 2015)
Co-advisor for WWU International Justice Mission (IJM) (2014-2016)
Tutorial Committee
Host various LEAD events each Semester

PROFESSIONAL AFFILIATIONS/MEMBERSHIPS AND SERVICE:

Genomic Education Partnership (GEP) (2016 – Current)

- GEP Assessment Committee (2019 – Current)

American Society of Microbiology Member (ASM) (1998 – Current)
Association for Biology Laboratory Education (ABLE) (2001 - Current)
MU Postdoctoral Association (University of Missouri) (2006 – 2012)
Bowling Green State University Biology Graduate Student Association (BGSA) (2004-2006)

- President (2004-2005)

Graduate Student Biological Sciences Learning Community (2005 – 2006)
Science Fair Judge ~ Northwest Ohio District 2 (2005)
American Association of University Women (AAUW) (2001 - 2006)
Equal Employment Opportunity and Compliance – EEOC – Committee Member (2000 – 2002)

- EEOC Sub-Committee - Exit Interview Committee Member (2001 – 2002)

Graduate Student Senate at Bowling Green State University

- Graduate Student Senate Vice-President (2001-2002)
- Graduate Student Representative to BGSU Faculty Senate (2001-2002)
- Graduate Student Representative to BGSU Faculty Senate Budget Committee (2001-2002)
- Graduate Student Senate Parliamentarian (1999-2001)

Ohio Academy of Science (OAS) (2000 – 2006)
Bowling Green State University Women's Center Advisory Board Founding Member Bowling Green State University's Women in Science Day Volunteer

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HONORS AND AWARDS:

Louis D. Beaumont Dad's Association Distinguished Professor Award for Excellence in Teaching, William Woods University, May 2020

Biological Sciences Award in Teaching Excellence, Department of Biological Sciences, Bowling Green State University, January 2001

Graduate College Outstanding Teaching Assistant Award Finalist, Bowling Green State University, June 2000

Green Key, Wilmington College Honor Society, October 1992

Ryan Gettler

31 N Cedar Lake Dr. West, Apt 205, Columbia, MO 65203 | 573-257-7722 | rcgvhd@umsystem.edu

Education

BS : MAY 2018 | COLUMBIA COLLEGE, COLUMBIA MO

- Major: Chemistry
- Related coursework: General Physics, General Chemistry, Analytical, Organic, Inorganic, and Physical Chemistry, Transport Phenomena
- GPA: 4.0
- Recipient: Transfer Excellence Scholarship
- Recipient: Grev Excellence Award

PHD : IN PROGRESS | UNIVERSITY OF MISSOURI, COLUMBIA MO

- Major: Chemical Engineering
- Related coursework: Statistical Mechanics, Mass, Heat and Momentum Transfer, Molecular Dynamics, Quantum Mechanics, Semiconductor Optics, Polymers, Thermodynamics
- GPA: 4.0

Skills & Abilities

LABORATORY

- IR Spectroscopy, Gas Chromatography, HPLC, Mass Spectrometry, Proton NMR, Solution Preparation, Organic Synthesis, Analytical Separation and Quantification, Spectroscopic Ellipsometry, Electro-chemistry/analytics, RMC and MD simulations

COMPUTER

- MS Word, MS Excel, MS PowerPoint, Python, LAMMPS

Related Experience

SOIL ANALYSIS | COLUMBIA COLLEGE DEPT. OF CHEMISTRY | JANUARY 2016 – MAY 2016

- Saponification and methylation of fatty acid samples, laboratory standard preparation, GC-FID analysis and FAME profile identification
- Successfully identified sulfate-reducing bacteria biomarkers and quantified them
- Determined sulfate/sulfur concentrations for correlation

SEWAGE ANALYSIS | COLUMBIA COLLEGE DEPT. OF CHEMISTRY | JANUARY 2017 – MAY 2017

- Performed solid phase extraction of influent and effluent wastewater samples
- Identified natural and synthetic estradiol via MSTFA derivitization and GC-MS analysis

Other Experience

Toxicology | U.S. Geological Survey | Sep 2017 – June 2019

- Perform titrations, instrument calibration, water quality analysis, lipid extraction and quantification, data entry and analysis, ICP-MS, ion chromatography

Dept of Chemical Engineering | University of Missouri | Aug 2019 – Present

- Electrodeposition of conductive polymers, electroanalysis, impedance spectroscopy, spectroscopic ellipsometry, synthesis of electrochemical sensors, material structure determination by reverse Monte Carlo and molecular dynamics simulations

GLENN GILYOT

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EDUCATION

University of Missouri-Columbia Aug 2016 - Ongoing
Ph.D. Organic Chemistry
IMSD-NIH Fellow (2016-2018)
PI: Timothy Glass, PhD

University of Missouri-Columbia Jan 2019 – Ongoing
Graduate Certificate: Science Outreach

Xavier University of Louisiana May 2016
B.S. Chemistry
PI: Candace Lawrence, PhD

PROFESSIONAL EXPERIENCE

Graduate Teaching Assistant Aug 2018-Ongoing
University of Missouri-Columbia

- Managed undergraduate students in organic and general chemistry laboratory courses.
- Assisted students in conducting common chemical reactions and organic syntheses.
- Educated students on proper time management, synthetic techniques, waste disposal, and safety protocols.
- Conducted weekly discussion sections to prepare students for lab sessions.
- Hosted weekly office hours and regular review sessions prior to exams.

NIH-IMSD Fellow/Graduate Research Assistant Aug 2016-Ongoing
University of Missouri-Columbia

- Designed and actively synthesizing a small molecule fluorescent sensor for detection of Neuropeptide-Y in chromaffin cells.
- Designed and actively synthesizing a small molecule fluorescent sensor for detection of Streptavidin.
- Synthesized a near-IR small molecule fluorescent sensor for tracking blood pH in red blood cells. Long-term imaging of blood pH was achieved through encapsulation of sensor in red blood cells using low hemoglobin ghosting procedure.
- Mentored one undergraduate researcher. Assisted him in designing experiments, taught him synthetic techniques, and trained him on proper usage of equipment, such as UV/Vis spectrometer, fluorimeter, and NMR.

RISE Scholar/Undergraduate Research Assistant May 2013 – 2016
Xavier University of Louisiana

- Research Emphasis: Modification of Nucleobases with Utilization of Polyamines for Anti-Cancer Drug Therapy
- Research Emphasis: Utilization of Nucleobase Interactions to Develop Supramolecular Polymer Hybrids
- Research Emphasis: Utilization of Nucleobase Interactions to Develop Supramolecular Polymer Hybrids and Electron Transfer Systems

OUTREACH EXPERIENCE

Southeast Louisiana Council June 2011 – Dec 2018
Boy Scouts of America (BSA)

- Served as a chemistry, medicine, first aid and public health merit badge counselor at Summer, Thanksgiving and Winter Camps.
- Guided scouts through chemistry experiments, such as gel electrophoresis, acid-base reactions, and polymer formation.

Future Business Leaders of America-Phi Beta Lambda Mar 2013 – June 2016
Career and Technical Student Organization (CTSO)

- Led fun chemistry workshops at state and national conferences. Engaged attendees in experiments, such as making film cannister rockets and instant ice cream in a bag.
- Mentored student members interested in careers at chemists through regular emailing and contact on social media.

AWARDS AND FELLOWSHIPS

University of Missouri Green Chalk Teaching Award	Dec 2020
Initiative for Maximizing Student Development (IMSD)-NIH Fellow	Aug 2016 – 2018
XULA Center for Undergraduate Research Travel Grant	Mar 2016
RISE Scholar	Aug 2015
Entergy New Orleans Academic Scholarship	Jan 2015
XULA Center for Undergraduate Research Grant	May 2013
Xavier University of Louisiana Academic Scholarship	Aug 2011

PRESENTATIONS

Gilyot, G., Cooley, N., Glass, T. (2020) *Near-IR pH Sensors for Long-Term Blood pH Measurement*. Poster Presentation delivered at the 2020 NOBCChE National Conference, Virtual, September 2020.

Gilyot, G., Porter, M., Lawrence, C. (2016) *Utilization of Nucleobase Interactions to Develop Guanosine Hydrogels and Supramolecular Polymer Hybrids*. Poster Presentation delivered at the 251st ACS National Meeting and Exposition, San Diego, CA, March 2016.

Gilyot, G., Porter, M., Lawrence, C. (2015) *Utilization of Nucleobase Interactions to Develop Supramolecular Polymer Hybrids*. Poster Presentation delivered at the Grad Fair Showcase at Xavier University of Louisiana, New Orleans, LA, October 2015.

Gilyot, G., Porter, M., Lawrence, C. (2015) *Utilization of Nucleobase Interactions to Develop Supramolecular Polymer Hybrids*. Poster Presentation delivered at the Festival of Scholars at Xavier University of Louisiana, New Orleans, LA, April 2015.

Porter, M., Gilyot, G., Lawrence, C. (2015) *Utilization of Nucleobase Interactions to Develop Supramolecular Polymer Hybrids*. Poster Presentation delivered at the 249th ACS National Meeting and Exposition, Denver, CO, March 2015.

Gilyot, G., Porter, M., Lawrence, C. (2014) *Utilization of Nucleobase Interactions to Develop Supramolecular Polymer Hybrids*. Poster Presentation delivered at the Center for Undergraduate Research Poster Session at Xavier University of Louisiana, New Orleans, LA, July 2014.
Gilyot, G., Johnson, B., Lawrence, C. (2014) *Modification of Nucleobases with Utilization of Polyamines for Anti-Cancer Drug Therapy*. Poster Presentation delivered at the Festival of Scholars at Xavier University of Louisiana, New Orleans, LA, April 2014.

Gilyot, G., Johnson, B., Lawrence, C. (2014) *Modification of Nucleobases with Utilization of Polyamines for Anti-Cancer Drug Therapy*. Poster Presentation delivered at the Center for Undergraduate Research Poster Session at Xavier University of Louisiana, New Orleans, LA, July 2013.

SKILLS

- Microsoft Office (Word, Excel, PowerPoint)
- ChemDraw
- Nuclear Magnetic Resonance Spectroscopy
- UV/Vis Spectroscopy
- Fluorescence Spectroscopy
- Infrared Spectroscopy
- Air-free Reactions
- Column Chromatography
- Thin-Layer Chromatography
- Red Blood Cell Ghosting

Annual Assessment Report

Biology BS

Faculty Responsible for the Report

Annual Assessment Report

Program Profile

	2014-2015	2015-2016
Majors (total, majors 1,2,3)	48	66
Minors		
Pre Vet	42	43
Pre Med	9	27
Full Time Faculty	3	3
Part Time Faculty	0	0

*If your discipline has a **secondary education certification component**, you will need to indicate that in the title of this report unless you are submitting a separate report for the education component.*

If your discipline is a major with **one or multiple concentrations, that information needs to be included as separate content. Report the number of declared students by concentration and each concentration will need a separate assessment section.*

Program Delivery (HLC 3A3)

Traditional on-campus ____100%____

Online Program ___0%_____

Evening Cohort _____0%____

Analysis:

Program goals for student retention, persistence and degree completion are? What do the persistence numbers mean to the faculty in the program? Are your persistence and graduation data what you expected? If yes, what has made for this success? If not, how could they be improved? Consider the students' "time to degree." Does the actual time to degree fit and reflect the program's expected and advertised time? If not, are there ways to align the two?

Outside Accreditation:

Is your program accredited by outside accreditor? If "yes", name the accrediting agency and include the cycle for accreditation review.

Is accreditation available for your program? **NO**

Are you making strides to attain accreditation? If no, why not?

Program Action Items

Action Item 1:	To develop new program objectives that align with national standards (AAAS Vision & Change in Undergraduate Biology Education). This will improve the learning outcomes assessment of our assessment plans by bringing our objectives into "best practices."
Action steps:	1. Investigate implementation at other institutions that have successfully adopted *Vision & Change* objectives. 2. Adapt *Vision & Change* objectives to meet the specific needs of the William Woods University educational environment. 3. Restructure assessment matrices to align with new objectives.
Timeline	Completed in conjunction with the 5-year program review.
Faculty Responsible	Robin Hirsch-Jacobson, Kimberly L. Keller, Nicholas A. Pullen
Evaluation	Successful deployment of new biology program objectives.

Action Item 2:	Devise new interview strategies utilized for external review of our intermediate students (2nd and 3rd year) during the annual spring assessment activities.
Action steps:	1. Research potential issues. 2. Develop a structure that aligns with the content offered at WWU. 3. Develop a fair rubric/evaluation plan for the new interviews.
Timeline	By Spring assessment days.
Faculty Responsible	Robin Hirsch-Jacobson, Kimberly L. Keller, Nicholas A. Pullen
Evaluation	Deployment of a bank of new interview questions.

Program Objectives:

1. Demonstrate knowledge of cell ultra-structure and basic cellular process and develop an understanding of the requisites of life.
2. Converse with the basic tenets of transmission, molecular, development and population genetics.
3. Give an overview of the major organ system of the human body OR a comparative overview of these systems in the vertebrates. Either option will include the normal and pathological function of those organ systems.
4. Demonstrate knowledge of the diversity and taxonomy of organisms and the significance of variation in morphology, behavior and life history
5. Explain the role that natural selection, genetic drift and other phenomena have had on the production of biological diversity and the role evolution has in integrating explanations of both unity and diversity of life.
6. Demonstrate knowledge of scientific methodologies and usage of current scientific equipment and technologies.

Program Objectives Matrix

	Obj. 1	Obj. 2	Obj. 3	Obj. 4	Obj. 5	Obj. 6
BIO114/115	I, A	I		I	I	I, A
BIO124/125	R	I	I, A	R	R, A	R
BIO231/232	R	M, A			R	R, A
BIO401		M		M	M	R
BIO450						M
CHM114/115						R
CHM124/125						R
CHM314/315						I, M
External Assessment: Biology MFT	A	A		A	A	
External Assessment: Assessment Day Interviews	A				A	
External Assessment: Entry Student Assessment Day Instrument	A		A		A	

Field Course:

	Obj. 1	Obj. 2	Obj. 3	Obj. 4	Obj. 5	Obj. 6
BIO310/322, BIO330/331, or BIO 400			R 310/322	M, A	M	M

A & P Course:

	Obj. 1	Obj. 2	Obj. 3	Obj. 4	Obj. 5	Obj. 6
BIO313/314 or BIO317/318	M	R	M, A	M 317/318	M 317/318	M

Math Course:

	Obj. 1	Obj. 2	Obj. 3	Obj. 4	Obj. 5	Obj. 6
Mat124 or MAT 204						R

All objectives must be assessed either yearly or as articulated on a cycle. Objectives are not necessarily assessed each time they are listed as a Program objective for the course. The faculty in the program determine when the objective will be assessed, in which course, with which artifact, and what if any outside assessment will occur.

Fill in the chart with Program Specific Content- Much of this can come from past annual reports. When identifying the methods, consider fall and spring courses and assignments to identify appropriate assessments for the objectives. Best practices recommend multiple measures of assessment for each objective

Assessment of Program Objectives

Objective 1	Demonstrate knowledge of cell ultra structure and basic cellular process and develop an understanding of the requisites of life.
Methods	ETS Major Field Test Final exam questions in BIO 114/115 Intermediate student interviews on assessment day. Entry Student Assessment Day Instrument

Benchmark	Average score of 53 or higher on section 1 of the field test, with 60% above 50. • 70% at proficient or better (BIO114/115) • Dept. average of 3/5 on assessment day interview. Entry Level Instrument: class average 60% or above; 25% of students at or above 70%.
Data Collected (course specific)	*BIO 114/115: ~79% were proficient or better, n=46. An overarching long response essay question covering subcellular and molecular principles (*e.g. *polarity of water, ATP, cell structure, and gene expression).*
Data Collected (external to the course)	*ETS, Section 1: Average did not surpass 53; 50% above score of 50.* *Entry Level Instrument: 63.6% class average; 35.7% scored higher than 70%, n=29.* *Intermediate Student Interviews: average =3.45; n=27*
Results/Outcomes	*Beginning students surpassed benchmark.* *ETS benchmark not achieved.* *Intermediate interview benchmark surpassed.*
Proposed changes to the assessment process	*None at this time.*
Budget needs related to the objective?	*Funding for MFT*

Objective 2	Converse with the basic tenets of transmission, molecular, development and population genetics.
Methods	ETS Major Field Test

	Final exam questions in BIO 231/232.
Benchmark	Average score of 53 or higher on the field test, with 60% above 50. 70% at proficient or better
Data Collected (course specific)	*BIO 231/232: ~79% proficient, n=29.* *Final exam question addressing the Central Dogma of Molecular Biology.*
Data Collected (Assessment Day, external tests, Senior Achievement)	*ETS: overall average = 51; 55% above 50.*
Results/Outcomes	*Genetics course benchmark achieved.* *ETS benchmarks not achieved.*
Proposed changes to the assessment process	*None at this time.*
Budget needs related to the objective?	*Funding for MFT*

Objective 3	Give an overview of the major organ system of the human body OR a comparative overview of these systems in the vertebrates. Either option will include the normal and pathological function of those organ systems.

Methods	Final exam questions in BIO 124/125 Final exam questions in BIO 313/314 Final exam questions in BIO 317 /318 Final exam questions in EQS 306 Entry Student Assessment Day Instrument
Benchmark	• 70% at proficient or better for each exam Entry Level Instrument: class average 60% or above; 25% of students at or above 70%.
Data Collected (course specific)	*Final Assessment for BIO 317/318: 68.75% proficient or better; n=16* *BIO 124/125: 85.8% proficient or better, n=28* *EQS: 87% proficient; n=15*
Data Collected (Assessment Day, external tests, Senior Achievement)	*Entry Level Instrument: 63.6% class average; 35.7% scored higher than 70%, n=29.*
Results/Outcomes	*BIO 317/318 benchmark not achieved.* *BIO 124/125 benchmark surpassed.* *EQS 306 benchmark surpassed.* *Entry level student benchmark achieved.*
Proposed changes to the assessment process	*None at this time.*
Budget needs related to the objective?	*No*

Objective 4	Demonstrate knowledge of the diversity and taxonomy of organisms and the significance of variation in morphology, behavior and life history.
Methods	ETS Major Field Test Final exam questions in BIO 310/322 Final exam questions in BIO 330/331 Final exam questions in BIO 400
Benchmark	Average score of 53 or higher on the field test, with 60% above 50. 70% at proficient or better
Data Collected (course specific)	*BIO 330/331: 90% of students proficient; n=20. Final exam questions addressing morphology and taxonomical classification schemes.* *ETS: Average score = 50; 65% above 50; n=20.*
Data Collected (Assessment Day, external tests, Senior Achievement)	*ETS: Average score = 50; 65% above 50; n=20.*
Results/Outcomes	*BIO 330/331 students surpassed benchmark.* *ETS average benchmark not achieved, however percent above 50 benchmark surpassed.*
Proposed changes to the assessment process	*None at this time.*
Budget needs related to the objective?	*Funding for the MFT*

Objective 5	Explain the role that natural selection, genetic drift and other phenomena have had on the production of biological diversity and the role evolution has in integrating explanations of both unity and diversity of life.
Methods	ETS Major Field Test Final exam questions in BIO 124/125 Intermediate student interviews on assessment day. Entry Student Assessment Day Instrument
Benchmark	Average score of 53 or higher on the field test, with 60% above 50. • 70% at proficient or better (BIO 124/125) • Dept. average of 3/5 on assessment day interview. Entry Level Instrument: class average 60% or above; 25% of students at or above 70%.
Data Collected (course specific)	*BIO 124/125: 85.8% proficient or better, n=28*
Data Collected (Assessment Day, external tests, Senior Achievement)	*ETS: Average score = 50; 65% above 50; n=20.* *Entry Level Instrument: 63.6% class average; 35.7% scored higher than 70%, n=29.* *Intermediate Student Interviews: average =3.45; n=27*
Results/Outcomes	*ETS average benchmark not achieved, however percent above 50 benchmark surpassed.* *Entry level student benchmark achieved.* *Intermediate student benchmark surpassed.*
Proposed changes to the assessment process	*None at this time.*

Budget needs related to the objective?	*MFT funding*

Objective 6	Demonstrate knowledge of scientific methodologies and usage of current scientific equipment and technologies.
Methods	Final practical in BIO 115 Final exam questions in BIO 232 Final exam questions in CHM 440/441
Benchmark	70% at proficient or better for each exam
Data Collected (course specific)	*BIO 115: ~78% proficient, n=45. Based on performance of a cumulative practical examination.* *BIO 232: ~87% proficient, n=29. Technique-based questions on two separate lab practical exams.* *CHM 440/441: 80% proficient, n=20.*
Data Collected (Assessment Day, external tests, Senior Achievement)	*N/A*
Results/Outcomes	*All benchmarks surpassed.*
Proposed changes to the assessment process	*None at this time.*

Budget needs related to the objective?	*No*

Concentration: Pre-Med Objective

Objective 7	Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.
Methods	Standardized interviews of non-seniors during annual assessment days. Resumé/CV writing and standardized interviews in BIO450
Benchmark	≥75% interview responses satisfactory or better. 100% of students produce professional CV.
Data Collected (course specific)	*BIO 450: 100% produced CVs.; 90% satisfactory interviews, n=20.*
Data Collected (Assessment Day, external tests, Senior Achievement)	*N/A*
Results/Outcomes	*Seniors surpassed benchmarks in BIO 450.*
Proposed changes to the assessment process	*None at this time.*
Budget needs related to the objective?	*No*

Concentration: Pre Vet Objective

Objective 7	Construct a competitive candidacy for admission to veterinary medicine programs: integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.
Methods	Standardized interviews of non-seniors during annual assessment days. Resumé/CV writing and standardized interviews in BIO450
Benchmark	≥75% interview responses satisfactory or better. 100% of students produce professional CV.
Data Collected (course specific)	*BIO 450: 100% produced CVs.; 90% satisfactory interviews, n=20.*
Data Collected (Assessment Day, external tests, Senior Achievement)	*N/A*
Results/Outcomes	*Seniors surpassed benchmarks in BIO 450.*
Proposed changes to the assessment process	*None at this time.*
Budget needs related to the objective?	*No*

Attach Rubrics and or other explanatory documents pertaining to program assessment discussed in the chart to the report (portfolio guidelines, assignment sheet)

Analysis of Assessment:

This was the second Fall using these assessment paradigms. While in some areas there was a slight decline, all student populations surpassed benchmarks. Science faculty are satisfied with their respective course-specific components of this program.

This is the first semester using BIO 115 for Objective 6 assessment. Faculty are satisfied with this change (from organic chemistry).

For a professions-oriented mission statement, we are satisfied with current preparation (and measurement of achievement) of our students.

Analysis of the Assessment Process (Empirical & Non-Empirical) (HLC4B3)

In many ways our scores reflect the changes in our student body (lower achieving, see University-wide ACT scores). We have streamlined our assessment by changing objectives to more accurately assess our students' competencies.

Program Changes Based on Assessment:

This will be the final year that these objective are assessed. The program will be switching to new objectives based on AAAS Vision & Change, outlined in the 5-year program report (AY15-16).

The following objectives will replace BS objectives 1-6; however the concentration-specific objectives will remain, and now be objective 5:

New Learning Objectives*:

1. Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept – evolution from common ancestry – in the unity of numerous biological processes among species.
2. Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.
3. Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
4. Information and energy: demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.

*As a scientific discipline grounded in hypothesis-driven empirical work, it is expected that most of these objectives will be addressed with experimental learning experiences using contemporary laboratory techniques in addition to traditional dassroom interactions.

General Education Assessment:

Communication: In all biology coursework students are expected to prepare and perform presentations on content-specific topics, in addition to extensive written technical papers and essays.

Mathematics: In all biology coursework students are expected to generate and interpret statistics. Math provides students with the quantitative background to perform these activities.

Critical Thinking: In all biology coursework students are expected to integrate sound logical arguments with the scientific method.

Meaning: In all biology coursework students are expected to analyze and interpret general textbooks, primary scientific literature, and data.

Ethical Reasoning: In all biology coursework students are expected to articulate the ethical interface of scientific practice and general societal issues, as well demonstrate integrity in their own scientific communications (oral and written).

Historical Perspective: In all biology coursework students are expected to demonstrate competency with the historical development of scientific principles – that the natural process of scientific development involves building upon the ideas of scientific progenitors.

Fine Arts: ***Creative and Aesthetic Sensibility*****:** In all biology coursework students are expected to demonstrate creative and independent generation of ideas based upon scientific parameters that they are presented, *e.g.* independently generating novel hypotheses regarding specific issues that they might be given.

Natural Sciences: The foundation of the entire program.

Social Sciences: In all biology coursework students are expected to apply their knowledge of human behavior in the context of molecular to organismal processes (*e.g.* how the human body works and thinks) in addition to the formation of new scientific ideas.

Diversity: In all biology coursework students are expected to articulate that there are variable correct interpretations of authoritative scientific principles.

Program Activities:

Student Performance Day Activities (Assessment Day):

Schedule for Student Performance Reviews – Biology Department

Tuesday, February 16 – Wednesday, February 17, 2016

Tuesday – February 16, 2016			
Time	**Activity**	**Location**	**Attendance**
10:00 -12:00pm	**REQUIRED** CLA Testing	**Cox 200**	**REQUIRED – Non-transfer Seniors**
10:00 – 12:00pm	**REQUIRED** Personal Interviews – Via Appointment	Report to **Cox 209**	**REQUIRED** - All students Enrolled past BIO231/232, but not Seniors
1:00 – 4:30pm	**REQUIRED** Personal Interviews – Via Appointment	Report to **Cox 209**	**REQUIRED** - All students Enrolled past BIO231/232, but not Seniors

5:30 – 6:30pm	**REQUIRED - Departmental Speaker** **Briana Kille** (Doctoral Candidate) ***When vulnerability is strength: Stress, sickness and the microbiome*** **University of Missouri** **Dept. of Psychology Sciences**	**Library Auditorium**	**REQUIRED ALL BIOLOGY MAJORS**
Wednesday – February 17, 2016			
10:00 – 12:00pm	**REQUIRED** Biology Major Field Tests	**Cox 200** **Cox313**	**REQUIRED – ALL Seniors**
10:00 – 12:00pm	**REQUIRED** Biology Assessment	**Cox 300**	**REQUIRED** - Currently Enrolled in BIO124/125
1:00 –3:00pm	**REQUIRED** Personal Interviews – Via Appointment	Report to **Cox 209**	**REQUIRED** - All students Enrolled past BIO231/232, but not Seniors

Seniors = Anyone currently enrolled in BIO401 (Evolution) having a May or December 2016 Graduation date.

Biology Assessment Exam is required for all Biology Majors who are currently enrolled in BIO124/125 (or have received credit for this Course) but have NOT taken BIO231/232 (Genetics).

A **Personal Interview** is required for every Biology Major student that has taken BIO231/232 (Genetics) but is not currently enrolled in BIO401 (Evolution).

There are sign-up sheets on the Bulletin Board outside of Cox202. You should plan on 30 minutes for your interview (arrive 10 before, then a 10 minute interview, 10 minute post interview questions), **casual dress** is fine.

Career Programming

Below is a list of other events scheduled during Student Performance days and are for **LEAD credit**.

These events are **not required** as part of **our Biology Major Assessment and Student Performance Days** Activities, but you are strongly encouraged to attend any and all events you feel would be helpful.

Tuesday, February 16 at 10 a.m.

12 Day Challenge - Crossfit for your Career

Library Auditorium

Join Career Services in getting your career plan in shape with an easy 12 day challenge!!

Tuesday, February 16 at 1 p.m.

The Best and Worst Ways to Find a Job

Library Auditorium

The job market is competitive. Some job seekers will do just about anything to stand out from the crowd. This session will explore the fine line between appearing determined and appearing desperate.

Wednesday, February 17 at Noon

How to Follow Up Without Falling Through

Ivy Room, Tucker Dining Hall

You found your dream job/internship, completed the online application, uploaded your rockstar resume and cover letter, and hit submit. Now what? You MUST follow up. In fact, your follow up may be the determining factor that lands you the job.

Wednesday, February 17 at 3 p.m.

The Forbidden Topic.....Salary Negotiation

Library Auditorium

Salaries seem to be 'off limits' during the hiring process, so how do you know if you should negotiate an offer or not? This session will explore the pros and cons of negotiating your salary.

DIRECTIONS

1. **Take 10 minutes to think about how you want to answer the following two questions.**

2. **<u>DO NOT</u> use your cell phone, or google, or any other outside resources including other students.**
3. **Feel free to make notes for your responses**
4. **Please do not share these questions or your answers until the end of assessment days.**

Answer two questions: one from each category below.

Category A

Are humans altering the direction and/or rate of evolution?

Compare & contrast binomial nomenclature with systematics (cladistics)

Category Z

Why is water important for life (in Biology)?

In what ways does contemporary (modern) genetics differ from Mendelian?

Senior Achievement Day Presentations:

Students prepare and present a poster in the style of a professional scientific conference. All students concurrently present their posters. Students gain experiences in a pseudo-professional atmosphere where they are expected to answer challenging questions by integrating prior knowledge and course content, as well as gain experience presenting complex material to a diverse group. Students are assessed on the quality of their posters, the depth of their knowledge, and the competence of material presentation.

No changes are to be implemented at this point.

Service Learning Activities:

N/A

Program Sponsored LEAD Events:

Poster session for the BIO 450 students.

Hosted an event on the Bryant Scholars pre-admissions program for the MU-School of Medicine. Faculty worked to develop this relationship and offering to our students.

Faculty hosted numerous events concerning broad social issues in and out of the discipline.

Kim Keller hosted "Get a Jump on Your Applications," preparing students for the processes associated with applying to graduate & professional schools.

Student Accomplishments:

Damon Burrow: presented research at the American Physical Society conference at Notre Dame (Nov. 2015).

Drew Olson: Funded summer biochemical research at the University of Missouri-Columbia.

Rachael Ostrem: Funded summer agricultural research at Iowa State University. Received the Distinguished Scholar award.

Joan Ryan: Received the Faculty Award; presenting at the American Association of Immunologists annual meeting in Seattle, WA (on her mesenchymal stem cell project).

Kristy McElwee: semester-long research project performing fecal egg counts on the WWU equine herd.

Cassie Dunn: yearlong research into the production of Trefoil Factors and IL-3 in diverse cancer phenotypes. Admitted to formal summer research program at the School of Medicine at Virginia Commonwealth University.

Sara VanAusdal: admitted to a formal summer research program on chicken genomes at Iowa State University.

Anna Blecha: Admitted to a formal summer research program on various conservation projects with the Illinois Department of Natural Resources.

Alexis Bailey: returning to formalized summer research at Arizona State University (bioinformatics institute).

Faculty Accomplishments:

Alumni (Recent Graduates) Accomplishments (past year graduating class):

Emily Magnuson matriculated into the D.V.M. program at the University of Missouri.

Victoria Berlin matriculated into an advanced-practice nursing program at the University of Saint Mary

Katey Bilsky is a bacteriophage laboratory technician at Vivolac Cultures Corporation.

Joan Ryan: Offered admission to DVM program at Colorado State University (CSU), and graduate programs at University of Northern Colorado and CSU – chose CSU.

Rachael Ostrem: Offered admission to DVM programs at MU and Iowa State University, matriculating into the latter.

Alexadrea Dru: Offered admission to graduate school at Thomas Jefferson University and DVM program at Ross University, matriculating into the latter.

Annual Assessment Evaluation

Assessment Component	Assessment Reflects Best Practices	Assessment Meets the Expectations of the University	Assessment Needs Development	Assessment is Inadequate
Learning Objectives	• Detailed, measurable program learning objectives • Objectives are shared with students and faculty	• Measurable program learning objectives. • Learning objectives are available to students.	• Program learning objectives are identified and are generally measurable	• Program learning objectives are not clear or measurable
Assessment Measures	• Multiple measures are used to assess a student-learning objectives. • Rubrics or guides are used for the measures. • All measurements are clearly described. • External evaluation of student learning included.	• Assessment measures relate to program learning objectives. • Various measures are used to assess student learning. • Measures chosen provide useful information about student learning.	• Assessment focuses on class content only. • Minimal description of how the assessment relates to the objective. • Minimal assessment measures established.	• Assessment measures not connected to objectives. • Assessment measures are not clear. • No assessment measures are established.
Assessment Results	• All objectives are assessed annually, or a rotation schedule is provided. • Data are collected and analyzed to show learning over time. • Standards for performance and gaps in student learning are clearly identified.	• Most objectives assessed annually. • Data collected and analyzed showing an annual snapshot of student learning. • Data are used to highlight gaps in student learning. • Some data from non-course based content.	• Data collected for at least one program objective. • Data collection is incomplete. • Gaps in student learning not identified. • Lacking external data to support course data.	• Learning objectives are not routinely assessed. • Routine data is not collected. • No discussion on gaps in student learning. • No use of external data to support student learning. • Assessment data not yet collected.
Faculty Analysis and Conclusions	• Data is shared that incorporates multiple faculty from the program. • Discussions on data results incorporate multiple faculty. • Opportunities for adjunct faculty to participate. • Includes input from external sources when possible.	• Multiple program faculty receive assessment results. • Assessment results are discussed • Specific conclusions about student learning are made based on the available assessment results.	• Minimal faculty input about results is sought • Data not used to determine success or not to the objective. • Minimal conclusions made.	• Faculty input is not sought. • Conclusions about student learning are not identified. • N/A Program recently started or too few graduates to suggest any changes.
Actions to Improve Learning and Assessment	• All assessment methods, timetable for assessing, and evaluating the effectiveness modifications are included. • Changes to assessment are inclusive of multiple faculty. • Description of changes is detailed and and linked to assessment results.	• More than one change to assessment is proposed, timetable for assessment, and evaluating the change is provided. • Changes to assessment measures is highlighted. • Changes are realistic, with a good probability of improving learning or assessment.	• At least one change to improve learning or assessment is identified. • The proposed action(s) relates to faculty conclusions about areas for improvement. • Adjustments to the assessment are proposed but not	• Lacking actions to improve student learning. • Actions discussed lack supportive data. • Lacking discussion of the effectiveness of the assessment plan

			clearly connected to data	

Program: Biology BA

Additional Comments:

Any discussion on how the program is going to handle the growth or continued growth in the numbers of students? Are the objectives for the BA and the BS exactly the same? I thought the BS had concentration objectives? They are not included in this report that I can see?

Make sure to come up with a statement or identify a program goal for retention and degree completion. Not sure why EQS data is included on objective 3 in the data charts? I think that is part of the BS concentration??? Chem 440 is also used in the provided data for student success, but it is not listed as a course on the matrix that is in the program. The program did a good job of describing the data provided and clearly explanation of what is being presented. In the data charts there are several objectives where students did not meet the benchmark, but in the area on Analysis of Assessment, the report claims that all benchmarks were met. There were several that were not, mostly related to the ETS exam. Good discussion on the program objectives and why they were changed.

For General Education make sure to align to the new format with the 4 components instead of the individual 9 components

Biology BS Annual Assessment 2016-2017

Created by Assessment Insight System

Annual Assessment

Biology BS

Program Profile

Program Mission Statement
Please insert your program mission statement here

A professionally oriented program with two concentrations specifically designed to both educate students in the biological sciences and prepare them for acceptance into graduate or professional programs.

Program Data

Delivery Method

Traditional On Campus (selected)
Online
Hybrid

Students Majors 2015-2016

66

Student Minors 2015-2016

Student Majors 2016-2017

63

Student Minors 2016-2017

Concentrations 2015-2016
If your program contains concentrations, please list the concentrations and the number of students identified within each concentration.

Pre-Med Concentration

Pre-Vet Concentration

*There is a discrepancy between the total number of concentrations (43 PreVet and 27 PreMed) resulting in 70 majors, yet the number of declared B.S. majors being 66

Concentrations 2016-2017
If your program contains concentrations, please list the concentrations and the number of students identified with each concentration.

Pre-Med Concentration

Pre-Vet Concentration

*There is a discrepancy between the total number of concentrations (34 PreVet and 36 PreMed) resulting in 70 majors, yet the number of declared B.S. majors being 63

Student Demographics
Program goals for student retention, persistence and degree completion are? What do the persistence numbers mean to the faculty in the program? Are your persistence numbers what you expected? If not, how could the numbers be improved? What is the optimal enrollment for the program?

Our Department has a program goal of 75% retention between freshman and sophomores, a 90% persistence per year, and with a 100% completing the program that enter their Senior year.

The retention data shows that 74.5%, though there is enough error in the data where we do not feel we can use this data to assess our benchmark. By our pogram goal mentioned above, we would expect a graduation rate ~60%. The current data shows a graduation rate of 54.5% for those students entering 2010/2011. These students entered prior to the current Biology faculty being higher, we expected to see higher rates moving forward.

*These data seem to be compiled for our BA and BS degrees, thereby negating our ability to fully assess one program over the other.

Is the Program Externally Accredited

Yes
No (selected)

External Accreditation
Name the Accrediting Agency or entity including the last review/approval. Is there an accrediting body for the field of study? If yes, what is the name of the group. Is the program seeking accreditation?If no, why?

Program Assessment

Standard/Outcome

Identifier	Description
WWU2016.1	Major Field Competence: Students will demonstrate excellence in an academic or professional discipline, and engage in the process of academic discovery.
WWU2016.2	Ethics: Students will exhibit values and behaviors that address self- respect and respect for others that will enable success and participation in the larger society.
WWU2016.3	Self-Liberation: Students will develop an honest understanding and appreciation of themselves and others resulting in an ability to make individual decisions.
WWU2016.4	Lifelong Education: Students will possess an intellectual curiosity and desire for continual learning both within and beyond formal education in preparation for participation in a global society.

Additional Standards/Outcomes

Identifier	Description
BIO.1	Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
BIO.2	Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.

BIO.3	Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
BIO.4	Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.
BIO Pre-Med.5	Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.
BIO Pre-Vet.5	Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.

General Education Alignment to Program
How do the General Education criteria align with the Program Objectives? What courses within your program build upon skills learned in general education courses (please list the program course and the general education criteria). The General Education clusters are: Critical Analysis, Creative Expression, Quantitative Inquiry, and Society & the Individual. See attached for more detailed breakdown.

Critical Analysis: (9 credit hours) – *Students apply logical and analytical reasoning skills to diverse source materials in the interest of discerning and debating aesthetic, thematic, and ethical content.*

In all biology coursework students are expected to integrate sound logical arguments with the scientific method. Students are expected to analyze and interpret general textbooks, primary scientific literature, and data. Throughout biology courses, students are expected to articulate the ethical interface of scientific practice and general societal issues, as well demonstrate integrity in their own scientific communications (oral and written).

Creative Expression: **(12 credit hours) –** *Students develop the ability to express ideas and concepts, both logically and creatively, through written, oral, reflective, and aesthetic practices utilizing various media forms.*

In all biology coursework, students are expected to demonstrate creative and independent generation of ideas based upon scientific parameters that they are presented, *e.g.* independently generating novel hypotheses regarding specific issues that they might be given. Students are expected to prepare and perform presentations on content-specific topics, in addition to extensive written technical papers and essays.

Quantitative Inquiry: (10 credit hours) – ***Students will develop and practice quantitative problem-solving skills in order to analyze and critically evaluate information in a larger context.***

Quantitative inquiry is the foundation of the entire biology program. In all biology coursework students are expected to analyze data, evaluate it critically, and to be able to generate and interpret statistics. Math courses provide students with the quantitative background to perform these activities.

Society & the Individual: (12 credit hours) – *Students integrate knowledge to articulate an understanding of diverse cultures, historical contexts, and human behaviors.*

In all biology coursework students are expected to apply their knowledge of human behavior in the context of molecular to organismal processes (*e.g.* how the human body works and thinks) in addition to the formation of new scientific ideas. Students are expected to be able to articulate that there are variable correct interpretations of authoritative scientific principles and demonstrate competency with the historical development of scientific principles – that the natural process of scientific development involves building upon the ideas of scientific progenitors.

Curriculum Map

A - Assessed
I - Introduced
R - Reinforced
M - Master

Bachelor of Science - Core Assesment

	BIO 114	BIO 124	BIO 231	BIO 310	BIO 330	BIO 401	BIO 450	CHM 114	CHM 124	CHM 314	PHY 201	PHY 212	SPR
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	I	R, A	R	R	R	A, M							A
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	I, A	R	R	R	R	R		I	R	R	I	R	A
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	I	A, R	R	R	R	M		I	R	R			A
BIO.4 Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	I	R	A, R			R							A

Biology BS: PreMed Concentration

	BIO 313	BIO 317	CHM 324	CHM 440	MAT 124	MAT 214	MAT 304	BIO 450	SPR
BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of	R	R	R	R	R	R	R	A, M	A

other medical school specific admission factors that the individual student must meet.									
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	R	R							
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	R	M	M	R	R	R		
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	M	M	R	R					
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	R	R	M	M					

Biology BS: PreVet Concentration

	BIO 303	**CHM 324**	**CHM 440**	**MAT 124**	**MAT 304**	**EQU 111**	**EQU 117**	**EQS 306**	**EQS 376**	**EQS 404**	**BIO 450**	**SPR**
BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.	R	R	R	R	R	I	I	R	R	M	A, M	A
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	R							R	R			
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings	R	R, M	M	R	R			R	R	R		

that govern complex living systems.												
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	M	R	R					M	M	M		
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	M	M	M					R	R	M		

Assessment Findings

Assessment Findings for the Assessment Measure level for Bachelor of Science - Core Assesment

BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.

Assessment Measures

BIO 124				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Final Exam	Has the criterion Questions from the lecture Final Exam (BIO124) that were relevant to objective 3 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Met	92% of the students were proficient or better (n = 25).		

BIO 401				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Final Exam	Has the criterion Questions from the lecture Final Exam (BIO401) that were relevant to objective 3 were selected for assessment. The benchmark is 70% of the students at Proficient or better.	71.4% of the students were proficient or better (n = 25).	BIO_401_Spring_17_Assessment_data___Obj1.xlsx	

	Proficient is defined as 70% or better on the assessed questions. been met yet? Met			

Student Performance Review				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion Students are asked a question regarding some aspect of Molecular structure in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: Average score for all students in the major 3/5 or higher been met yet? Not met	Average score on interview question was 2.9 (scale 1 - 5, n = 25)	SP17_Student_Assessment_Interview_Questions_BS.xlsx	- Refine Assessment Tool: The average for our students was an average score of 2.9 and the benchmark for the students was an average of 3.0. While our students did not meet the benchmark, they were extremely close. As a department, we will review the question(s) we use for this assessment.
Direct - External Testing	Has the criterion Major Field Test - Section: III Benchmark = Average score of 53 or higher on section, with 60% of students scoring above 50. been met yet? Not met	Benchmark of average score of 53 or higher on section, MET. Average score was 54% (n = 18). We had two students that were definite outliers to this cohort. Without their data for the average score, this Senior cohort met or exceeded the average score of 53 or higher for this section. Benchmark of 60% of students scoring above 50 on given section was NOT MET. 50% of the students score 50 or above on section (n = 20).	Spring_17_MFT_Cohort_Data_Seniors.xlsx	- Revise Program Benchmark: Only the Benchmark of 60% of students scoring above 50 on given section was NOT MET. Only 10 out of the 20 students (50%) score 50 or above on section. This section of the Major Field Test contains a large number of questions regarding plant biology, and at this time the Biology curriculum does not contain a plant component. Department will consider lowering the benchmark for this section due to the fact there is content assessed in this section that is not covered by our curriculum.

Direct - External Testing	Has the criterion Major Field Test - Section: IV Benchmark = Average score of 53 or higher on section, with 60% of students scoring above 50. been met yet? Met	Refer to data entered for Major Field test entry under Objective 1. Benchmark of average score of 53 or higher on section was MET. Average score was 55 (n = 18). We had two students that were definite outliers to this cohort. Without their data for the average score, this Senior cohort met or exceeded the average score of 53 or higher for this section. Benchmark of 60% of students scoring above 50 on given section was also MET. 65% scored 50 or above on section (n = 20).		

BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.

Assessment Measures

BIO 114				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Final Exam	Has the criterion Questions from the lecture Final Exam (BIO114) that were relevant to objective 2 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Met	82.9% of the of the exam questions assessed were answered correctly; however, data in the future needs to be collected on a per student basis.	WWU_Bio114_Assessment_F16.xlsx	

Student Performance Review				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**

Direct - External Testing	Has the criterion Major Field Test - Section: I Benchmark = Average score of 53 or higher on section, with 60% of students scoring above 50. been met yet? Not met	Refer to data entered for Major Field Test entry under Objective 1. Benchmark of average score of 53 or higher on section was MET. Average score was 53 (n = 18). We had two students that were definite outliers to this cohort. Without their data for the average score, this Senior cohort met or exceeded the average score of 53 or higher for this section. Benchmark: 60% of students scoring above 50 on given section was NOT MET. 50% of the students scored 50 or above on section (n = 20).		- : Only the Benchmark of 60% of students scoring above 50 on given section was NOT MET as only 50% of our students scored 50 or above on section. We feel our curriculum does cover the information assessed by this section of the MFT and that some of our students simply under performed in this section. The Department will review the types of questions used in this section to determine whether the benchmark is appropriate for this section.
Direct - External Testing	Has the criterion Major Field Test - Section: II Benchmark = Average score of 53 or higher on section, with 60% of students scoring above 50. been met yet? Met	Refer to data entered for Major Field Test entry under Objective 1. Benchmark of average score of 53 or higher on section was MET. Average score was 53 (n = 18). We had two students that were definite outliers to this cohort. Without their data for the average score, this Senior cohort met or exceeded the average score of 53 or higher for this section. Benchmark of 60% of students scoring above 50 on given section was also MET. 60% of our students scored 50 or above on section (n = 20).		

BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.

Assessment Measures

BIO 124				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Final Exam	Has the criterion Questions from the lecture Final Exam (BIO124) that were relevant to objective 3 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Not met	52% of the students were proficient or better (n = 25).	BIO_124_Spring_17_Assessment_data___Obj_3.xlsx	- Refine Assessment Tool: The questions for this objective were too specific in scope, where many students knew some but not all of the details. To truly assess the objective the questions should assess overall concept knowledge as opposed to some of the more finite and nuanced details.

Student Performance Review				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion Students are asked a question regarding some aspect of Evolution in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: Average score for all students in the major 3/5 or higher been met yet? Met	Average score on interview question was 3.0 (scale 1 - 5, n = 25) Refer to data entered for Direct - Interview entry under Objective 1.		
Direct - External Testing	Has the criterion Major Field Test - Section: I Benchmark = Average score of 53 or higher on section, with 60% of students scoring above 50. been met yet? Not met	Refer to data entered for Major Field Test entry under Objective 1. Benchmark of average score of 53 or higher on section was MET. Average score was 53 (n = 18). We had two students that were definite outliers to this cohort. Without their		- : Only the Benchmark of 60% of students scoring above 50 on given section was NOT MET as only 50% of our students scored 50 or above on section. We feel our curriculum does cover the information assessed by this section of the MFT and that some of our

		data for the average score, this Senior cohort met or exceeded the average score of 53 or higher for this section. Benchmark: 60% of students scoring above 50 on given section was NOT MET. 50% of the students scored 50 or above on section (n = 20).		students simply under performed in this section. The Department will review the types of questions used in this section to determine whether the benchmark is appropriate for this section.
Direct - External Testing	Has the criterion Major Field Test - Section: II Benchmark = Average score of 53 or higher on section, with 60% of students scoring above 50. been met yet? Met	Refer to data entered for Major Field Test entry under Objective 1. Benchmark of average score of 53 or higher on section was MET. Average score was 53 (n = 18). We had two students that were definite outliers to this cohort. Without their data for the average score, this Senior cohort met or exceeded the average score of 53 or higher for this section. Benchmark of 60% of students scoring above 50 on given section was also MET. 60% of our students scored 50 or above on section (n = 20).		
Direct - External Testing	Has the criterion Major Field Test - Section: III Benchmark = Average score of 53 or higher on section, with 60% of students scoring above 50. been met yet? Not met	Refer to data entered for Major Field Test entry under Objective 1. Benchmark of average score of 53 or higher on section, MET. Average score was 54% (n = 18). We had two students that were definite outliers to this cohort. Without their data for the average score, this Senior cohort met or exceeded the average score of 53 or higher for this section. Benchmark of 60% of students scoring above 50 on given section was NOT MET. 50% of the students score 50 or above on section (n = 20).		- Revise Program Benchmark: Only the Benchmark of 60% of students scoring above 50 on given section was NOT MET. Only 10 out of the 20 students (50%) score 50 or above on section. This section of the Major Field Test contains a large number of questions regarding plant biology, and at this time the Biology curriculum does not contain a plant component. Department will consider lowering the benchmark for this section due to the fact there is content assessed in this section that is not covered by our curriculum.

BIO.4 Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.

Assessment Measures

BIO 231				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
	Has the criterion Questions from the lecture Final Exam (BIO231) that were relevant to objective 2 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 60% or better on the assessed questions. been met yet? Met	n = 22, 73% of the student averaged a 60% or better on specific questions about heritable traits and molecular processes relating to DNA replication and the Molecular Central Dogma (transcription and translation).	BIO_231_Fall_16_Assessment_data___Obj_4.xlsx	

Student Performance Review				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion Major Field Test - Percentile Rank (This scores students in all 4 sections of the MFT) Benchmark = 50% of students scoring in the 50th percentile or higher. been met yet? Not met	Only 35% of our students had a percentile rank of 50 or higher (n = 20). Refer to data entered for Major Field test entry under Objective 1.		- : While we did not meet our benchmark, two students had a rank of 49 percentile and two other students had a rank of 46. So, while our student did not met the requirement we feel the majority of our students did test well, especially knowing that two individuals severely under performed on this Major Field Test.

Assessment Findings for the Assessment Measure level for Biology BS: PreMed Concentration

BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.

Assessment Measures

Bio 450				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion 75% or greater of the student interview responses will be satisfactory or better. been met yet? Met	n = 17, 94% of the student interview responses were satisfactory or better for Fall 2016. n = 24, 96% of the student interview responses were satisfactory or better for Spring 2017 Therefore, 95% of our student interview responses were satisfactory or better for the 2016/2017 Academic year.		
Direct - Class Assignment	Has the criterion 100% of students produce a professional CV been met yet? Met	n = 17, 100% of students produced a professional CV in Fall of 2016 n= 24, 100% of students produced a professional CV in Spring 2017 Therefore, 100% (n=41) students produced a professional CV for the 206/2017 Academic year.		

Student Performance Review				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Indirect - Survey of Students	Has the criterion 60% of students actively participating in shadowing or other volunteer roles that will make them competitive for jobs in the medical and human healthcare related jobs and professional programs. been met yet? Met	Average for all three terms is 77% (n = 13) 69% of the PreMed students had shadowed, volunteered, or performed research outside of the classroom during the summer of 2016. 62% of the PreMed students were actively involved in shadowing, volunteering, or performing research outside of the classroom during the academic year of 2016/2017. 100% of the PreMed students had shadowing, volunteering, or performing research outside of the classroom during the Summer 2017 arranged or were waiting to hear about positions.		

Assessment Findings for the Assessment Measure level for Biology BS: PreVet Concentration

BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.

Assessment Measures

BIO 450				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion 75% or greater of the student interview responses will be satisfactory or better. been met yet? Met	n = 17, 94% of the student interview responses were satisfactory or better for Fall 2016. n = 24, 96% of the student interview responses were satisfactory or better for Spring 2017 Therefore, 95% of our student interview responses were satisfactory or better for the 2016/2017 Academic year.		
Direct - Class Assignment	Has the criterion 100% of students produce a professional CV. been met yet? Met	n = 17, 100% of students produced a professional CV in Fall of 2016 n= 24, 100% of students produced a professional CV in Spring 2017 Therefore, 100% (n=41) students produced a professional CV for the 206/2017 Academic year.		

Student Performance Review				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Indirect - Survey of Students	Has the criterion 60% of students actively participating in shadowing veterinarians and/or volunteering in other animal care avenues to make them competitive for applying to veterinarian schools. been met yet? Met	Average for all three terms is 76% (n = 11) Only 45% of the PreVet students had shadowed, volunteered, or performed research outside of the classroom during the summer of 2016. 82% of the PreVet students were actively involved in shadowing, volunteering, or performing research outside of the classroom during the academic year of 2016/2017. 100% of the PreVet students had shadowing, volunteering, or performing research outside of the classroom during the Summer 2017 arranged or were waiting to hear about positions.		

Analysis of the Assessment Process

Describe your assessment process; clearly articulate how the program is using course work and or assessment day activities for program assessment. Note any changes that occurred to that process since the previous year. Discuss what activities were successful at assessment and which ones were not as helpful and why. Please include who met to discuss the changes (unless you are a program of one person) and when you met. – Include a discussion on the process for collection and analysis of program data.

This report was compiled by the two biology faculty, Dr. Kimberly L. Keller and Dr. Robin Hirsch-Jacobson.

This was the first year of assessment using the new Biology Program Objectives.

There were a couple areas in which our majors did not meet the benchmark for certain Objectives, and summaries and improvement narratives are discussed under each assessment field. To summarize, the three main areas in which our students fell short of the benchmark were: (1) 60% of the students scoring a 50 or higher in each section of the Major Field Test; (2) 60% of the students scoring in the 50th percentile rank or higher on the Major Field Test; and (3) the interview questions connected to Objectives 1 and 3.

The Major Field Test (MFT) is given to our graduating Seniors during Student Performance Days in February. We have struggled in past years with the amount of effort our students give for this exam, as it is not associated with any particular course. While we are unclear whether it was lack of effort or other factors that led to two students performing well below the norm expected for our students on the MFT, but they performed so poorly that their data points were such extreme outliers to the rest of the cohort this year. With these two being such extreme outliers, we made the decision to remove their data before calculating the average score per section for the cohort, and in doing so; the average score for the cohort per section met/or surpassed the benchmark of a cohort average of 53 or higher. We did use their data for calculation of the 60% of students above 50 (Sections 1 -4 of MFT) and for determining if 60% were at the 50th percentile rank or higher (Objective 4), and their data is a contributing factor to those benchmarks being “Not Met.” Discussions will occur to see if there are ways to improve student effort on the MFT to have scores that do a better job of assessing student knowledge and the effectiveness of the program.

We feel the failure to meet the interview benchmarks as well as the final exam questions in BIO124 was partially due to trying to align several of our “old” assessment tools/questions to these new objectives. After a complete cycle with the new objectives, we feel we now have a better understanding of which courses and what type of data needs to be collected for each of these new objectives in order for our students to “met and/or surpass” the benchmarks next academic year. Changes in questions and benchmark reviews will occur next fall prior to the collection of data.

In addition, we look forward to the addition of Dr. Sarah Greenland-White to the department and the knowledge and enthusiasm she’ll bring. Weekly department meetings with all three Biology faculty will take place early in the fall to discuss any changes to the courses we will use for assessment and to communicate the types of data/questions we need to use for assessment purposes. Current discussions during the generation of this report is that we begin to assess at least one of our objectives (possibly Objective 3) using the required Field courses and the required Anatomy & Physiology courses. Additional discussions with the entire Biology faculty will occur this fall to insure everyone is satisfied with their respective course-specific components of the assessment of the program.

For a professions-oriented mission statement, we are satisfied with current preparation of our students, especially when you look at where our students are matriculating following graduation. Therefore, we feel only minor changes in our assessment are needed to accurately measure success of the Biology Program.

Improvement Narrative List

Assessment Findings for the Assessment Measure level

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	BIO 124
Assessment	Direct - Final Exam

Measure	
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Refine Assessment Tool	The questions for this objective were too specific in scope, where many students knew some but not all of the details. To truly assess the objective the questions should assess overall concept knowledge as opposed to some of the more finite and nuanced details.

Standard/Outcome	BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - Interview
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Refine Assessment Tool	The average for our students was an average score of 2.9 and the benchmark for the students was an average of 3.0. While our students did not meet the benchmark, they were extremely close. As a department, we will review the question(s) we use for this assessment.

Standard/Outcome	BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Revise Program Benchmark	Only the Benchmark of 60% of students scoring above 50 on given section was NOT MET. Only 10 out of the 20 students (50%) score 50 or above on

	section. This section of the Major Field Test contains a large number of questions regarding plant biology, and at this time the Biology curriculum does not contain a plant component. Department will consider lowering the benchmark for this section due to the fact there is content assessed in this section that is not covered by our curriculum.

Standard/Outcome	BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	**Improvement Type** / **Summary** Only the Benchmark of 60% of students scoring above 50 on given section was NOT MET as only 50% of our students scored 50 or above on section. We feel our curriculum does cover the information assessed by this section of the MFT and that some of our students simply under performed in this section. The Department will review the types of questions used in this section to determine whether the benchmark is appropriate for this section.

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	**Improvement Type** / **Summary** Only the Benchmark of 60% of students scoring above 50 on given section was NOT MET as only 50% of our students scored 50 or above on section. We feel our curriculum does cover the information assessed by this section of the MFT and that some of our students simply under performed in this section. The Department will review the types of questions used in this section to determine whether the benchmark is appropriate for this section.

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Revise Program Benchmark	Only the Benchmark of 60% of students scoring above 50 on given section was NOT MET. Only 10 out of the 20 students (50%) score 50 or above on section. This section of the Major Field Test contains a large number of questions regarding plant biology, and at this time the Biology curriculum does not contain a plant component. Department will consider lowering the benchmark for this section due to the fact there is content assessed in this section that is not covered by our curriculum.

Standard/Outcome	BIO.4 Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
	While we did not meet our benchmark, two students had a rank of 49 percentile and two other students had a rank of 46. So, while our student did not met the requirement we feel the majority of our students did test well, especially knowing that two individuals severely under performed on this Major Field Test.

Program Activities

Student Performance Review

Describe the department assessment day activities if not already described previously. Please articulate the nature of the assessments are conducted, explain the process for assessment that happens on these two days. Include the schedule of assessment day for your program. What does the data and outcomes tell you? What changes will you make as a result of the data? What areas are successful for the program?

In previous years had used an internally made exam to assess our incoming Biology majors; however, this year we had our incoming Biology majors take the Major Field Test (MFT) during Student Performance days. This change was done in order to add another level of assessment, one in which we will ultimately be able to measure knowledge gained and program success by assessing our students as they enter the program and then again as they leave during their final semester using the same assessment tool. Starting the Fall of 2017, we will be administering the MFT to the incoming class of Biology Majors during the second week of class in order to truly get their entry level knowledge base. In a few years, this will add another level of assessment for our program, in addition to us currently gaging where our exiting seniors compared to other Biology majors on a national level. Since the testing of incoming students will be move to the fall, our incoming students will need some sort of activity during the Student Performance Days. All incoming Biology students will be required to attend Breakout Sessions specific to their degree in Biology.

This year our students did poorly on the Interview Questions portions associated with content related to Objective 1 and Objective 3. Under each Objective, we gave two questions and allowed students a choice as to which one they would answer. In order to assess students on a more equal level, the department will write better questions that better align with the new Objectives and eliminate choice in questions.

Part of the Individual Interviews involves questions about what the students are doing “outside of their coursework” to make them competitive in the next stage of their career. We feel this is an important time to check in with our majors and learn about their plans are for the summer. It provides an opportunity to stress the importance of shadowing, volunteering, and getting internships in order to be successful at the next stage of their careers. No changes will be made to this portion, although the plan is to incorporate gathering this information in VIA in order to make data collection for assessment easier and more direct.

Every year during Student Performance Days we bring in a Speaker who gives research-based talk to the entire department. We feel it is extremely valuable for our students to witness such talks and we attempt to alternate the area of research presented each year in order to expose our students to the variety of sub-disciplines within Biology during their 4-years here at William Woods. Our students continually provide positive feedback about the speakers and it is common to hear them discussing the talk amongst themselves for the next several days. We plan to continue this as part of our student performance days.

Overall, we are very pleased with our Student Performance Days and feel we have a schedule that allows us to assess our students in a variety of manners, and the small changes mentioned above will only serve to better our assessment efforts of the Biology program.

Student Performance Review Schedule

Upload the program schedule for students during Performance Reviews.

Student_Performance_Days_Schedule___Spring_2017.docx

Senior Showcase

Describe program Senior Showcase activities if not detailed previously in the report? What benefit does the program gain from the activities? What if any assessment of students happens during this event? What changes if any will occur due to what is learned by faculty on Senior Showcase?

Students prepare and present a poster in the style of a professional scientific conference. All students concurrently present their posters. Students gain experiences in a pseudo-professional atmosphere where they are expected to answer challenging questions by integrating prior knowledge and course content, as well as gain experience presenting complex material to a diverse group. Students are assessed on the quality of their posters, the depth of their knowledge,

and the competence of material presentation. We had 17 students present posters in the fall and 5 students present posters in the Spring.

No changes are to be implemented at this point to the Senior Showcase requirements for our Biology majors.

Assessment Rubrics
Upload rubrics used for Senior Showcase or Student Performance Reviews for student assessment.

Service Learning
Does the Program include projects/ course content that uses the philosophy of service learning?
Yes
No (selected)

Service Learning Component
If so, how is service learning infused in the coursework within your department? Is service or community engagement in the program mission? Describe the Service Learning Activities that your students and department engaged in this past year. How did the activities improve student learning? How did the activities benefit the community?

LEAD Events
Highlight lead events sponsored by program faculty that are connected to program or general education objectives for the past academic year. Include a total number of lead events program faculty sponsored.

Poster session for the BIO 450 students.

Presented at the "Academic Success" LEAD point event that was part of Orientation. The presentation talked about study and time management strategies to be successful as a college student.

Hosted an event (Not LEAD) on the Bryant Scholars pre-admissions program for the MU-School of Medicine. Faculty worked to develop this relationship and offering to our students.

Student Accomplishments
Highlight special examples of student successes in the field (academic: mentor-mentee, conference presentations, competitive internship, journal acceptance; extra-curricular: horse show championship, art exhibit). This is for any accomplishments that a student achieved outside of course work or the normal expectations of student success.

Summer 2016:

Sara Van Ausdal: Funded summer agricultural research at Iowa State University.

Alexis Bailey: Formalized summer research at Arizona State University (bioinformatics institute).

Preston Wolfe: Shadowed an orthopedic surgeon and analyzed hip replacements utilizing X-rays.

Academic Year:

Maddie McMahill performed fecal egg counts and parasite monitoring of the entire WWU Equine herd.

Lainie Buff and Maddie McMahill successfully generated sterile Platelet-Rich Plasma from equine whole blood samples.

Biology Majors: Cassie Dunn, Jessica Doran, Nic Keithley, Ashley White, Kaitlin Turner, Paige Eickhoff, and Delanie Jones all grew cancer cells and Jennifer Strosnider, Sara Van Ausdal, and Ian Mayr operated the lasers for the Physics Laser Refraction Studies and worked with Dr. Vern Hart (Physic Professor) as part of hisCox Research Fellowship.

Missouri Academy of Science – April 22, 2017. T. O'Connor, J. Strosnider, C. Dunn, I. Mayr, K. Turner, J. Doran, A. White, N. Keithley, P. Eickhoff, S. Van Ausdal, and V. Hart. T. O'Connor gave a presentation on the groups research project. **Title:** Diffusive Optical Investigations of Cellular Structure Via Scattering Analysis Using a Near-Infrared Diode Laser. Biology majors that participated in that project are highlighted in yellow.

Missouri Academy of Science – April 22, 2017. Alexis C. Bailey and Alaina A. Buff presented a poster of their research: **Title: Prevalence of Tetracycline Resistance Genes in the Oral Microbiomes of a Population of William Woods University Students.**

Summer 2017:

Sara was accepted into the D.V.M. program at Iowa State University and the University of Missouri, she matriculated into the latter.

Rebecca Smith has an internship with Missouri Wildlife Conservation

May 2017 Graduates:

Alexis C. Bailey matriculated into the NIH Postbaccalaureate Intramural Research Training Award (Postbac IRTA) in Bethesda, MD.

Alicia VanMatre was accepted into the D.V.M. program at the University of Missouri and Purdue University, she matriculated into the latter.

Kristy McElwee matriculated into the D.V.M. program at the University of Missouri.

Jessica Doran matriculated into the M.D. program at the University of Missouri.

Kaitlin Turner matriculated into the Pharm D. (Doctor of Pharmacy) program at the University of Missouri-Kansas City

Drew Olsen matriculated into the Illinois Natural History Survey (River Conservation) in Illinois.

Preston Wolfe matriculated into a Master of Biomedical Science Program at the University of Northern Colorado.

Jennifer Strosnider matriculated into a Master of Science Program at the University of Alabama

In the future, we will discuss accomplishments from May the year before to time of report. At the start of the Fall semester, we will have the students turn in a written copy of any noteworthy summer accomplishments in order to fully report our student accomplishments..

Annual Assessment Rubric

Total Score: 15/15 (100.00%)

	3.000 **Assessment Reflects Best Practices**	2.000 **Assessment Meets the Expectations of the University**	1.000 **Assessment Needs Development**	0.000 **Assessment is Inadequate**	**N/A**
Learning Objectives weight: 1.000	✓ • Detailed, measurable program learning objectives • Objectives are shared with students and faculty	• Measurable program learning objectives. • Learning objectives are available to students.	• Program learning objectives are identified and are generally measurable	• Program learning objectives are not clear or measurable	N/A
Comment:					
Assessment Measures weight: 1.000	✓ • Multiple measures are used to assess a student-learning objectives. • Rubrics or guides are used for the measures. • All measurements are clearly described. • External evaluation of student learning included.	• Assessment measures relate to program learning objectives. • Various measures are used to assess student learning. • Measures chosen provide useful information about student learning.	• Assessment focuses on class content only. • Minimal description of how the assessment relates to the objective. • Minimal assessment measures established.	• Assessment measures not connected to objectives. • Assessment measures are not clear. • No assessment measures are established.	N/A
Comment:					
Assessment Results weight: 1.000	✓ • All objectives are assessed annually, or a rotation schedule is provided. • Data are collected and analyzed to show learning over time. • Standards for performance and gaps in student learning are clearly identified.	• Most objectives assessed annually. • Data collected and analyzed showing an annual snapshot of student learning. • Data are used to highlight gaps in student learning. • Some data from non-course based content.	• Data collected for at least one program objective. • Data collection is incomplete. • Gaps in student learning not identified. • Lacking external data to support course data.	• Learning objectives are not routinely assessed. • Routine data is not collected. • No discussion on gaps in student learning. • No use of external data to support student learning. • Assessment data not yet collected.	N/A
Comment:					
Faculty Analysis and Conclusions weight: 1.000	✓ • Data is shared that incorporates multiple faculty from the program. • Discussions on data results incorporate multiple faculty. • Opportunities for adjunct faculty to participate. • Includes input from external sources when possible.	• Multiple program faculty receive assessment results. • Assessment results are discussed • Specific conclusions about student learning are made based on the available assessment results.	• Minimal faculty input about results is sought • Data not used to determine success or not to the objective. • Minimal conclusions made.	• Faculty input is not sought. • Conclusions about student learning are not identified. • N/A Program recently started or too few graduates to suggest any changes.	N/A
Comment:					
Actions to Improve Learning and Assessment weight: 1.000	✓ • All assessment methods, timetable for assessing, and evaluating the effectiveness modifications are included. • Changes to assessment are inclusive of multiple faculty. • Description of changes is detailed and and linked to assessment results.	• More than one change to assessment is proposed, timetable for assessment, and evaluating the change is provided. • Changes to assessment measures is highlighted. • Changes are realistic, with a good probability of improving learning or assessment.	• At least one change to improve learning or assessment is identified. • The proposed action(s) relates to faculty conclusions about areas for improvement. • Adjustments to the assessment are proposed but not clearly connected to data	• Lacking actions to improve student learning. • Actions discussed lack supportive data. • Lacking discussion of the effectiveness of the assessment plan	N/A
Comment:					

Biology BS

Annual Assessment 2017-2018

Annual Assessment 17-18

Biology BS

Program Profile

Program Mission Statement
Please insert your program mission statement here

A professionally oriented program with two concentrations specifically designed to both educate students in the biological sciences and prepare them for acceptance into graduate or professional programs.

Program Data

Delivery Method

Traditional On Campus (selected)
Online
Hybrid

	Minors	Majors
2016-2017		63
2017-2018		57

Concentrations 2016-17
If your program contains concentrations, please list the concentrations and the number of students identified within each concentration.

	Pre-Med	Pre-Vet
2016-2017	36	34
2017-2018	21	14

2016-2017 *There is a discrepancy between the total number of concentrations (34 PreVet and 36 PreMed) resulting in 70 majors, yet the number of declared B.S. majors being 63

2017-2018 *There is a discrepancy between the total number of concentrations (14 PreVet and 21 PreMed) resulting in 35 majors, yet the number of declared B.S. majors being 57.

Student Demographics
Program goals for student retention, persistence and degree completion are? What do the persistence numbers mean to the faculty in the program? Are your persistence numbers what you expected? If not, how could the numbers be improved? What is the optimal enrollment for the program?

Our Department has a program goal of 75% retention between freshman and sophomores, a 90% persistence per year, and with a 100% completing the program that enter their Senior year.

The retention data shows that 55.6% for students they enter during 2012/2013, so we clearly did not meet our benchmark. We contribute the low retention rate, in part, due to the fact that we have had signifigant faculty turnover in the department as since 2014/2015 students have had to deal with at least one new science faculty in three of the five years.

By our program goal mentioned above, we would expect a graduation rate ~60%. The current data shows a graduation rate of 61.2% for new students who entered 2012/2013, showing even though our retention was lower than we would like, we wee successful at graduating the students we did retain.

Is the Program Externally Accredited

Yes
No (selected)

External Accreditation
Name the Accrediting Agency or entity including the last review/approval. Is there an accrediting body for the field of study? If yes, what is the name of the group. Is the program seeking accreditation?If no, why?

N/A

Program Assessment

Standard/Outcome

Identifier	Description
WWU2016.1	Major Field Competence: Students will demonstrate excellence in an academic or professional discipline, and engage in the process of academic discovery.
WWU2016.2	Ethics: Students will exhibit values and behaviors that address self- respect and respect for others that will enable success and participation in the larger society.
WWU2016.3	Self-Liberation: Students will develop an honest understanding and appreciation of themselves and others resulting in an ability to make individual decisions.
WWU2016.4	Lifelong Education: Students will possess an intellectual curiosity and desire for continual learning both within and beyond formal education in preparation for participation in a global society.

Additional Standards/Outcomes

BIO.1	Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
BIO.2	Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.
BIO.3	Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
BIO.4	Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.

Concentrations

BIO Pre-Med.5	Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.
BIO Pre-Vet.5	Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.

General Education Alignment to Program
How do the General Education criteria align with the Program Objectives? What courses within your program build upon skills learned in general education courses (please list the program course and the general education criteria). The General Education clusters are: Critical Analysis, Creative Expression, Quantitative Inquiry, and Society & the Individual. See attached for more detailed breakdown.

GE_Cluster_Descriptions_FINAL_Version_Approved.docx

Curriculum Map

A - Assessed
R - Reinforced
I - Introduced
M - Master

Bachelor of Science - Core Assessment

	BIO 114	**BIO 124**	**BIO 231**	**BIO 310**	**BIO 330**	**BIO 401**	**BIO 450**	**CHM 114**	**CHM 124**
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	I	R, A	R	R	R	A, M			
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	I, A	R	R	R	R	R		I	R
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	I	A, R	R	R	R	M		I	R
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	I	R	A, R			R			

	CHM 314	PHY 201	PHY 212	Student Performance Review
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.				A
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	I	R	A
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	R			A
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.				A

Biology BS: PreMed Concentration(Imported)

	BIO 313	BIO 317	CHM 324	CHM 440	MAT 124	MAT 214	MAT 304	BIO 450	SPR
BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.	R	R	R	R	R	R	R	A, M	A
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	R	R							
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	R	M	M	R	R	R		
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	M	M	R	R					
BIO.4 Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	R	R	M	M					

Biology BS: PreVet Concentration(Imported)

	BIO 303	CHM 324	CHM 440	MAT 124	MAT 304	EQU 111	EQU 117	EQS 306
BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.	R	R	R	R	R	I	I	R
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	R							R
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	R, M	M	R	R			R
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	M	R	R					M
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	M	M	M					R

	EQS 376	EQS 404	BIO 450	SPR
BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other veterinary school specific admission factors that the individual student must meet.	R	M	A, M	A
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	R			
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	R		
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	M	M		
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	R	M		

Assessment Findings

Assessment Findings for the Assessment Measure level for Bachelor of Science - Core Assesment(Imported)

BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.

Assessment Measures

BIO 124				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Final Exam	Has the criterion Questions from the lecture Final Exam (BIO124) that were relevant to objective 1 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Met	91% of the students (n=34) scored 70% or better on the six questions assessed	BIO_124_OBJ_1.xlsx	- Curriculum Revision: Remove assessing this objective from BIO124 as this Objective is already assessed twice, BIO401 (Evolution) and the Major Field Test.

BIO 401				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Final Exam	Has the criterion Questions from the lecture Final Exam (BIO401) that were relevant to objective 3 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Not met	Only 63% of the students (n=19) scored 70% or better on the six questions assessed	BIO_401_OBJ_1.xlsx	- Revise Assignment for Assessment: Near end of the course have a quiz that explicitly addresses this Objective Current benchmark will be maintained

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion Students are asked a question regarding some aspect of Evolution in which they must answer based on the knowledge they have gained through	Our students (n=19) averaged a score of 3.39 (scale 1-5) on this interview question	Student_Performance_Days_Interview_Results_for_Objectives_1_and_3__Spring_2018.xlsx	- Revise Program Benchmark: Revise to have 70% of students scoring a 3.5/5 or better on the question - Refine Assessment Tool: Move this from a Direct Interview

	various Biology Courses. Benchmark: Average score for all students in the major 3/5 or higher been met yet? Met			format to a more Direct Quiz/Exam based assessment using VIA
Direct - External Testing	Has the criterion Major Field Test - Section: III Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 46 or higher. been met yet? Met	86% of our students (n=14) scored a 46 or higher on Section III of the MFT and the average score for those students was 53, meaning both benchmarks were met this portion of the MFT.	Biology_MFT_Departmental_Roster_with_Section_Subscores_Seniors_Spring_2018.pdf	
Direct - External Testing	Has the criterion Major Field Test - Section: IV Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Met	93% of our students (n=14) scored a 51 or higher on Section IV of the MFT and the average score for those students was 59, meaning both benchmarks were met this portion of the MFT. See attachment for Bio Objective 1: Direct - External Testing - Major Field Test - Section: III for full results		

BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.

Assessment Measures

BIO 114				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Final Exam	Has the criterion Questions from the lecture Third Exam (BIO114) that were relevant to objective 2 were selected for assessment. The benchmark is 70% of	84% of the students were proficient or better (n = 48).	Assesment_questions_bio_114_2017.docx	

	the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Met			

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion Major Field Test - Section: I Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Met	64% of our students (n=14) scored a 51 or higher on Section I of the MFT and the average score for those students was 54, meaning both benchmarks were met this portion of the MFT. See attachment for Bio Objective 1: Direct - External Testing - Major Field Test - Section: III for full results		
Direct - External Testing	Has the criterion Major Field Test - Section: II Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Not met	Only 54% of our students (n=14) scored a 51 or higher on Section II of the MFT meaning the benchmark was not met for this portion of the MFT. However, the average score for those students was 53, meaning that benchmark was met for this portion of the MFT. See attachment for Bio Objective 1: Direct - External Testing - Major Field Test - Section: III for full results		

BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.

Assessment Measures

BIO 124				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Final Exam	Has the criterion Questions from the lecture Final Exam (BIO124) that were relevant to objective 3 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Not met	Only 67% of the students (n=34) scored 70% or better on the six questions assessed	BIO_124_OBJ_3.xlsx	- Revise Assignment for Assessment: Near end of the course have a quiz that explicitly addresses this Objective Current benchmark will be maintained

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion Students are asked a question regarding some aspect of Molecular structure in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: Average score for all students in the major 3/5 or higher been met yet? Met	The students (n=19) averaged a score of 3.37 (scale 1-5) on this interview question Data is attached to results of Direct Interview Question on Student Performance day for Objective 1		- Revise Program Benchmark: Revise to have 70% of students scoring a 3.5/5 or better on question
Direct - External Testing	Has the criterion Major Field Test - Section: I Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Met	64% of our students (n=14) scored a 51 or higher on Section I of the MFT and the average score for those students was 54, meaning both benchmarks were met this portion of the MFT. See attachment for Bio Objective 1: Direct - External Testing - Major Field Test - Section: III for full results		
Direct - External Testing	Has the criterion Major Field Test - Section: II Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet?	Only 54% of our students (n=14) scored a 51 or higher on Section II of the MFT meaning the benchmark was not met for this portion of the MFT. However, the average score for those students was 53, meaning this benchmark was met this portion of the MFT. See attachment for Bio Objective 1: Direct - External Testing - Major Field Test - Section: III for full results		
Direct - External Testing	Has the criterion Major Field Test - Section: III Benchmark = Average	86% of our students (n=14) scored a 51 or higher on Section I of the MFT and the average		

	score of 53 or higher on section, with 60% of students scoring a 46 or higher. been met yet?	score for those students was 53, meaning both benchmarks were met this portion of the MFT. See attachment for Bio Objective 1: Direct - External Testing - Major Field Test - Section: III for full results		

BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.

Assessment Measures

BIO 231				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
	Has the criterion Questions from the lecture Final Exam (BIO231) that were relevant to objective 4 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 60% or better on the assessed questions. been met yet? Met	74% of the students were proficient or better (n = 19).	Assesment_Data.xlsx	

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion Major Field Test - Percentile Rank (This scores students in all 4 sections of the MFT) Benchmark = 50% of students scoring in the 50th percentile or higher. been met yet? Met	64% of our BS students (n=14) scored in the 50th percentile or above on the full Major Field-test	SUBSCORES_and_PERCENTILES_from_MFT_for_Seniors.docx	

Assessment Findings for the Assessment Measure level for Biology BS: PreMed Concentration

BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.

Assessment Measures

BIO 450				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion 75% or greater of the student interview responses will be satisfactory or better. been met yet? Met	92% of our students (n=13) had satisfactory or better Mock Interview with the Biology faculty	BIO_450_01_FUL__ _Biology_Practicum_ __Mock_Faculty_Interviews.pdf	- Refine Assessment Tool: Generate a rubric regarding the expectations of a "satisfactory" interview to allow for better assessment.
Direct - Class Assignment	Has the criterion 100% of students produce a professional CV or Resume been met yet? Met	100% of our students (n=13) produced a professional quality CV or Resume	BIO_450_01_FUL__ _Biology_Practicum_ __Final_CV_Resume.pdf	

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Indirect - Survey of Students	Has the criterion 60% of students actively participating in shadowing or other volunteer roles that will make them competitive for jobs in the medical and human healthcare related jobs and professional programs. been met yet? Met	71% of our Pre-med students (n=7) actively participated in shadowing, volunteering, or a employment in the medical or human health area. For assessment, a student was considered to be actively participating in shadowing if that participated in shadowing either during the summer of 2017 or during the 2017-2018 academic year. Summer 2018 will be assessed next year due to the fact at the time of Student Performance Days our students were stilling waiting to hear about internships and REU, as well as still working on finalizing shadowing experiences.	Shadowing_Experiences_Summer_2017_and_17_18_Academic_Year.pdf	- Refine Assessment Tool: Use VIA to generate a survey and to collect data for our students regarding their shadowing experiences

Assessment Findings for the Assessment Measure level for Biology BS: PreVet Concentration(Imported)

BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.

Assessment Measures

BIO 450				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion 75% or greater of the student interview responses will be satisfactory or better. been met yet? Met	92% of the students (n=13) had a satisfactory or better mock interview with faculty Evidence of data is attached to Direct Interview in BIO450 under PreMed Concentration - Objective 5		- : Generate a rubric of the expectations of a "satisfactory" interview to allow for better assessment
Direct - Class Assignment	Has the criterion 100% of students produce a professional CV. been met yet? Met	100% of the students (n=13) produced a professional quality CV or Resume Evidence of data is attached to Direct - Class Assignment in BIO450 under PreMed Concentration - Objective 5		

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Indirect - Survey of Students	Has the criterion 60% of students actively participating in shadowing veterinarians and/or volunteering in other animal care avenues to make them competitive for applying to veterinarian schools. been met yet? Met	91% of our PreVet students (n=11) actively participated in shadowing a Veterinarian or worked at a Vet Clinic. For assessment, a student was considered to be actively participating in shadowing if that participated in shadowing either during the summer of 2017 or during the 2017-2018 academic year. Summer 2018 will be assessed next year due to the fact at the time of Student Performance Days our students were stilling waiting to hear about		- Refine Assessment Tool: Use VIA to generate a survey and to collect data for our students regarding their shadowing experiences

		internships and REU, as well as still working on finalizing shadowing experiences. Evidence of data is attached to Indirect - Survey of Students under Student Performance Days in the PreMed Concentration - Objective 5		

Analysis of the Assessment Process

Describe your assessment process; clearly articulate how the program is using course work and or assessment day activities for program assessment. Note any changes that occurred to that process since the previous year. Discuss what activities were successful at assessment and which ones were not as helpful and why. Please include who met to discuss the changes (unless you are a program of one person) and when you met. – Include a discussion on the process for collection and analysis of program data.

This report was compiled by the three biology faculty, Dr. Kimberly L. Keller, Dr. Robin Hirsch-Jacobson, and Dr. Sarah Greenland-White.

There were a few areas in which our majors did not meet the benchmark for certain Objectives, and summaries and improvement narratives are discussed under each assessment field with this report. To summarize, the two main areas in which our students fell short of the benchmark were: (1) 60% of the students scoring a 51 or higher in in Section 2 of the Major Field Test and (2) 70% of the students at Proficient or better on Final Exam questions, where proficient is defined as 70% or better on the assessed questions.

The Major Field Test (MFT) is given to our graduating seniors during Student Performance Days in February. We have struggled in past years with the amount of effort our students give for this exam; however, we do not feel this was the case this year and our students this year were engaged and as a whole, performed well on the exam. We feel the scores closely reflect the type and level of work the faculty have seen from these students in the classroom. All of the benchmarks for the objectives were “Met” except for one. The 60% of the students scoring a 51 or higher in in Section 2 of the MFT was “Not Met” by our B.S. students; however, this is not much of a concern because for that same section of the MFT these students “Met” the benchmark of average score for the cohort of 53. In addition, the benchmark of 50% of students scoring at the 50th percentile rank or higher (Objective 4) was also “Met” for this student cohort, While we will have discussions to determine how to best use the MFT to truly assess student knowledge and the effectiveness of the program; we feel the size of this cohort allows for accurate measuring of the program. While this is normally the case for the B.S. program, it is not always the case for B.A. program and supports combining our assessment reports to allow the largest sample size and get a truer assessment of the program. As described below, we have started collecting data that in the near future will allow us to assess “knowledge added” assessment by determining “value added” to their score on the MFT using entry and exit MFT scores of our Biology Majors.

This is the second year we have had our incoming Biology Majors take the MFT; however, this is the first year we had them take the exam literally as they are entering the Biology program. All incoming Biology Majors took the MFT during the second week of classes in the fall semester in BIO115, the laboratory associated with BIO114. As the data are for collection purposes only at this point, there is no benchmark attached to the scores for our “freshman.” Our long-term assessment plan for the program will occur when these same students take the MFT as an outgoing senior and then we will be able use the scores on the two exams to determine “value added” of each graduating student in the Biology program at William Woods University. The Biology faculty are excited about adding this new level of assessment of our seniors. These data could show that while an outgoing senior may not meet the benchmarks of the MFT when comparing it to the national scores (our current assessment), the same student may have an improvement in their score, showing the program was successful as there would be a definite “value added” assessment.

While our B.S. cohort “Met” the benchmark for the Direct Student Interview for both Objective 1 and Objective 3, we debate every year whether a low score for a question for any given student is due to lack of knowledge in the subject or if it is due to poor interview skills and the stress of answering in front of all three biology faculty. Due to this problem, we have come up with a two-fold solution. First, we plan to change the benchmark, currently we believe the benchmark will be 70% of the students scoring 3.5 or better on the question. We also feel it is hard to distinguish if the low score for a

question is due to lack of knowledge or due to poor interview skills and the stress of answering in front of all three biology faculty. The second change to this part of assessment will be to change from a Direct Interview format to a Direct Quiz format, in order to allow students to more completely answer each question. The only problem we have is this interview was also a time to 'check-in" with students and talk with them about things outside their course to make them successful. We will have further discussions about the importance of that component and if it feasible to do both a Direct Quiz and a Direct Interview during Student Performance Review Days.

We feel the failure to meet the benchmarks for the final exam questions in BIO124 and BIO401 was partially due to looking for questions on the exams that fit the objective instead of writing specific questions on the exam to meet the objective. This is actually a fault of all the Biology faculty and not unique to the faculty teaching those courses, and is something we as biology faculty are addressing for the upcoming assessment year. Our current new plan for assessment in courses is to have a Direct Quiz toward the end of the semester in which the questions are specifically designed around the objectives. As we have now completed our second assessment cycle with the new objectives, we feel we now have a better understanding of which courses and what type of data needs to be collected for each of these new objectives in order for our students to "met and/or surpass" the benchmarks next academic year. Changes in questions and benchmark reviews will occur next fall prior to the collection of data.

The addition of Dr. Sarah Greenland-White to the department has brought new knowledge and enthusiasm to the department. Weekly department meetings with all three Biology faculty took place throughout the academic year to discuss assessment and to communicate the types of data/questions we need to use for assessment purposes. As a department as a whole, we need to plan better for assessments occurring in our individual courses. Current discussions during the generation of this report is that we may begin to assess at least one of our objectives (possibly Objective 3) using the required Field courses and now that we have a full-time faculty teaching the required Anatomy & Physiology courses, we may want to consider assessing those as well. A comprehensive review of our Curriculum and Assessment maps will occur prior to the fall 2018 semester to make some possible changes to ensure everyone is satisfied with their respective course-specific components of the assessment of the program.

For a professions-oriented mission statement, we are satisfied with current preparation of our students, especially when you look at where our students are matriculating following graduation. Therefore, we feel only minor changes in our assessment are needed to accurately measure success of the Biology Program. We do feel strongly that writing one Assessment Report and combining the B.A. and B.S. students would be a much truer assessment of the Biology program as a whole.

Improvement Narrative List

Assessment Findings for the Assessment Measure level

<table>
<tr><td>Standard/Outcome</td><td>BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.</td></tr>
<tr><td>Legend</td><td>A</td></tr>
<tr><td>Course/Event</td><td>BIO 124</td></tr>
<tr><td>Assessment Measure</td><td>Direct - Final Exam</td></tr>
<tr><td>Assessment Findings</td><td>Met</td></tr>
<tr><td>Improvement Narrative</td><td>
<table>
<tr><th>Improvement Type</th><th>Summary</th></tr>
<tr><td>Curriculum Revision</td><td>Remove assessing this objective from BIO124 as this Objective is already assessed twice, BIO401 (Evolution) and the Major Field Test.</td></tr>
</table>
</td></tr>
</table>

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	BIO 124
Assessment Measure	Direct - Final Exam
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Revise Assignment for Assessment	Near end of the course have a quiz that explicitly addresses this Objective Current benchmark will be maintained

Standard/Outcome	BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
Legend	A
Course/Event	BIO 401
Assessment Measure	Direct - Final Exam
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Revise Assignment for Assessment	Near end of the course have a quiz that explicitly addresses this Objective Current benchmark will be maintained

Standard/Outcome	BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - Interview
Assessment Findings	Met
Improvement Narrative	

Improvement Type	Summary

	Revise Program Benchmark: Revise to have 70% of students scoring a 3.5/5 or better on the question Refine Assessment Tool: Move this from a Direct Interview format to a more Direct Quiz/Exam based assessment using VIA

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - Interview
Assessment Findings	Met
Improvement Narrative	**Improvement Type**: Revise Program Benchmark **Summary**: Revise to have 70% of students scoring a 3.5/5 or better on question

Standard/Outcome	BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.
Legend	A
Course/Event	BIO 450
Assessment Measure	Direct - Interview
Assessment Findings	Met
Improvement Narrative	**Improvement Type**: Refine Assessment Tool **Summary**: Generate a rubric regarding the expectations of a "satisfactory" interview to allow for better assessment.

Standard/Outcome	BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.
Legend	A
Course/Event	Student Performance Review

Assessment Measure	Indirect - Survey of Students
Assessment Findings	Met
Improvement Narrative	<table><tr><th>Improvement Type</th><th>Summary</th></tr><tr><td>Refine Assessment Tool</td><td>Use VIA to generate a survey and to collect data for our students regarding their shadowing experiences</td></tr></table>

Standard/Outcome	BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.
Legend	A
Course/Event	BIO 450
Assessment Measure	Direct - Interview
Assessment Findings	Met
Improvement Narrative	<table><tr><th>Improvement Type</th><th>Summary</th></tr><tr><td></td><td>Generate a rubric of the expectations of a "satisfactory" interview to allow for better assessment</td></tr></table>

Standard/Outcome	BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Indirect - Survey of Students
Assessment Findings	Met
Improvement Narrative	<table><tr><th>Improvement Type</th><th>Summary</th></tr><tr><td>Refine Assessment Tool</td><td>Use VIA to generate a survey and to collect data for our students regarding their shadowing experiences</td></tr></table>

Program Activities

Student Performance Review

Describe the department assessment day activities if not already described previously. Please articulate the nature of the assessments are conducted, explain the process for assessment that happens on these two days. Include the schedule of assessment day for your program. What does the data and outcomes tell you? What changes will you make as a result of the data? What areas are successful for the program?

We use Student Performance Days to have our senior students take the Major Field Test (MFT) in Biology. Our BS senior cohort, which is Pre-Med and Pre-Vet concentration, included 14 students this year and this senior group surpassed all of the benchmarks from the MFT assessment except the one of the two benchmarks associated with Section II of the MFT.

This academic year, we were able to administer the MFT to the incoming class of Biology Majors in the fall by doing it the second week of classes in the fall semester in BIO115, the laboratory associated with BIO114. This change was made in order to truly capture the entry level knowledge base of each of our incoming students majoring in Biology. In a few years, this data will be use to add another level of assessment of our program, we will be able to determine the amount of "value added" from participation in our Biology program. This will be a valuable assessment in addition to our current use of the MFT to evaluate the knowledge of our exiting seniors compared to other Biology majors on a national level. As this data is being used solely to generate an entry level baseline, there is no benchmark for this data at this time; however, the results of the MFT for those students is being placed here as evidence the data was collected, even though it occurred in the fall of 2017 and will not officially be utilized for a few years.

With the moving of the testing of incoming students to the fall, our incoming students Student Performance Day activities involved three separate 30 minute Breakout Sessions, one for each of our Biology Degree Programs. All incoming Biology students were required to attend Breakout Sessions specific to their degree in Biology in which requirements of their Major were discussed, as well as a Question & Answer session about their major, jobs, and other related issues.

This year our Biology BS students did very well on the Direct Student Interview Questions portion and we were very pleased that these students surpassed the benchmark for both Objective 1 and Objective 3. In previous years, for each Objective, we gave two questions and allowed students a choice as to which one they would answer. This year, in order to assess students on a more equal level, we only had one question per objective for students to answer, thus eliminating any question bias. We are considering making changes to this part of the Student Performance Day and to change from an interview format to a more formal testing process utilizing VIA to collect data. The questions will then be individually assessed by all Biology Faculty and an average score per question obtained. We feel we may get better answers per question if we have students type out their answers. Right now it is hard to assess whether their lack of an appropriate answer is due to their lack of knowledge obtained from their classes or whether their poor answers are due to being nervous about answering questions in an interview format in front of all three Biology Faculty.

Part of the Individual Interviews also involves questions inquiring what the students are doing "outside of their coursework" to make them competitive in the next stage of their career. We feel this is an important time to check in with our majors and learn about what their plans are for the summer. It provides an opportunity to stress the importance of shadowing, volunteering, and getting internships in order to be successful at the next stage of their careers. Since we also plan to collect the shadowing data using VIA as well for easier data collection for assessment, we will need to consider if it is feasible to maintain some type of interview to check in with students about their progress in obtaining the appropriate shadowing, volunteering, and internships to make them competitive.

Every year during Student Performance Days we bring in a Speaker who gives research-based talk to the entire department. We feel it is extremely valuable for our students to witness such talks and we attempt to alternate the area of research presented each year in order to expose our students to the variety of sub-disciplines within Biology during their 4-years here at William Woods. Our students continually provide positive feedback about the speakers and it is common to hear them discussing the talk amongst themselves for the next several days. We plan to continue this as part of our student performance days. This year we held a Meet & Greet/Question & Answer reception after the seminar for students to interact with the speaker, and that was well attend and successful. Therefore, it is definitely something we will continue to incorporate that into our Student Performance Day schedule.

Overall, we are very pleased with our Student Performance Days and feel we have a schedule that allows us to assess our students in a variety of manners, and the small changes mentioned above will only serve to better our assessment efforts of the Biology program.

Student Performance Review Schedule
Upload the program schedule for students during Performance Reviews.
Student_Performance_Days_Schedule___Spring_2018.pdf
Freshman_Fall_Biology_MFT_Departmental_Roster_with_Section_Subscores.pdf

Senior Showcase
Describe program Senior Showcase activities if not detailed previously in the report? What benefit does the program gain from the activities? What if any assessment of students happens during this event? What changes if any will occur due to what is learned by faculty on Senior Showcase?

We had 13 of our 14 biology students presented a poster at the Senior Showcase on Thursday, April 19, 2018

Assessment Rubrics
Upload rubrics used for Senior Showcase or Student Performance Reviews for student assessment.

Service Learning
Does the Program include projects/ course content that uses the philosophy of service learning?
Yes
No (selected)

Service Learning Component
If so, how is service learning infused in the coursework within your department? Is service or community engagement in the program mission? Describe the Service Learning Activities that your students and department engaged in this past year. How did the activities improve student learning? How did the activities benefit the community?

N/A

LEAD Events
Highlight lead events sponsored by program faculty that are connected to program or general education objectives for the past academic year. Include a total number of lead events program faculty sponsored.

Robin Hirsch-Jacobson - **Conservation Within Our Zoos** - Learn about the efforts and actions that zoos are taking to help improve the lives of animals across the world through various conservation and wildlife projects. Also, hear direct accounts from individuals who interned at the St. Louis Zoo while also gaining knowledge on different animal species around the world. Monday, April 16, 2018

Kimberly L. Keller - Senior Showcase - Poster Presentations by Biology Majors - Senior Biology students completing their capstone course will present a scientific conference type poster on a topic of their choice for Senior Showcase. Students attending this event will complete a reflection form on the students/posters they visit to receive LEAD credit. The poster presentations will be given continuously throughout the scheduled event. Eighteen posters will be on display in Burton 104 and Burton 105 for students to review. April 19, 2018

Kimberly L. Keller - Parasitic Resistance in Horses - W**hat is it and does it exist in any of the horses at William Woods University.** Dr. Kimberly L. Keller, Assistant Professor of Biology, will present the results of her Cox Distinguished Professorship in Science Research which involved surveying the equine herd population for parasites. If any of the horses tested positive for parasites, attempts were made to determine if that parasite had acquired any resistance to the deworming medicines used here on campus at William Woods University. Come and hear Dr. Keller talk about her research and the results of this study. April 25, 2018

Student Accomplishments
Highlight special examples of student successes in the field (academic: mentor-mentee, conference presentations, competitive internship, journal acceptance; extra-curricular: horse show championship, art exhibit). This is for any accomplishments that a student achieved outside of course work or the normal expectations of student success.

Clark Cox Distinguished Professor in Science Research Project (2017 – 2018 academic year) **Title: Prevalence of Resistance in Microorganisms Testing the Presence of Resistance Genes in Oral Microbiomes and Equine Parasites.** This Cox Research Project is divided into two separate projects.

• **Lance Leverenz** – Research involves testing for the presence of tetracycline resistance genes (tetA and tetR) in the Oral Microbiomes of William Wood University students. The research involves isolating gDNA from salvia samples of students and then using PCR techniques to determine the presence of the tetA and tetR genes.

• **Rebecca Smith and Emily Tichy** – Research involves performing fecal eggs counts on the ~150 horses from William Woods an then perform two week rechecks on any horse that tested positive and was treated with deworming medications. The goal is to attempt identify any horses on campus that appear to be infested with Strongyle resistance parasites. Once resistance parasites are identified, we will attempt to grow those parasites and further test their resistance.

Phil Kulpinski (Fall 2017 - Current) Research is a collaborative effort with the City of Fulton to help collect data about organic pollutants using the GC/MS and to test for Escherichia coli contamination in a waterway, Stinson Creek, which runs through the city. Stinson Creek has been classified as an impaired (that is, pollution-damaged) waterway d by the Missouri Depart of Natural Resources to have issues. Stinson Creek's classification as an impaired (that is, pollution-damaged) waterway by the Department of Natural Resources.

Current Students - Summer 2017 Successes - Presentations at the Fall 2017 Biology Retreat and 4-year planning session

Rachael Barker - Context and reasoning: The resistance to "resistance" - Department of Biological Sciences, North Dakota State University, Collaborations in Discipline-based Education Research (CIDER), Research experience for Undergrauates (REU).

Megan Wilson - St Louis Zoo Internship Working with African Ungulates - St. Louis, MO

Phil Kulpinski - What is a CNA (Certified Nursing Assistant)? Insights and benefits of working as a CNA at the Fulton Manor. Fulton, MO

December 2017 and April 2018 Gradute Accomplishments:

Ava Demanes	Accelerated BSN at Goldfarb, St. Louis MO
Nic Keithley	University of Missouri - Masters of Health Administration (Accredited)
Gabby Kleinow	Accelerated BSN Goldfarb, St. Louis MO
Lance Leverenz	Missouri State University – Doctoral of Physical Therapy

Alumni/Previous Graduates

Maddie McMahill (May 17) is now working as a laboraotry technician at The Great Plains Laboratory, Inc. in Kansas City, MO

Lainie (Alaina) Buff (May 17) is working as a laboraotry technician at Biogen in Raleigh, NC

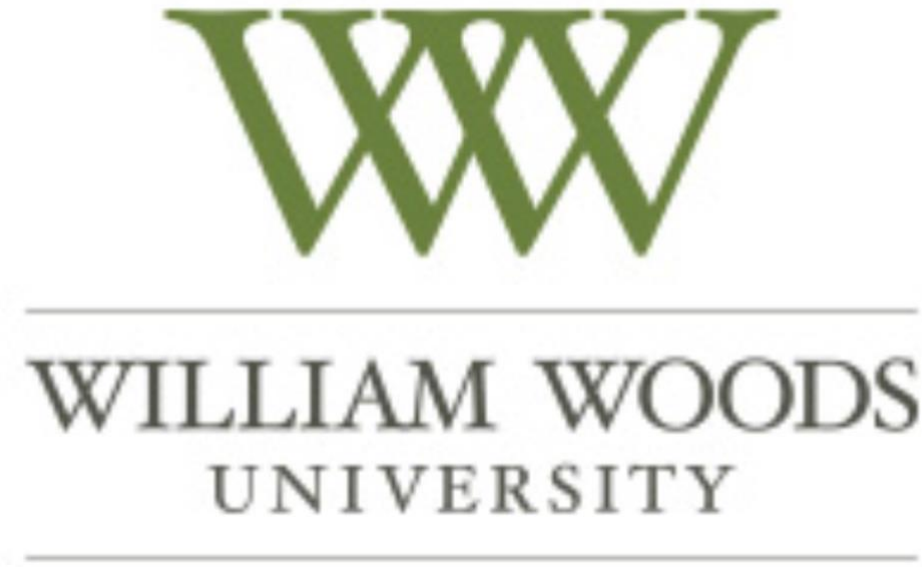
Faculty Accomplishments
Highlight special examples of faculty success in the profession/field/content area. This is for any accomplishment of a faculty activity/research/professional nature.

Kimberly L. Keller - Clark Cox Distinguished Professor in Science Research Project (2017 – 2018 academic year) Title: Prevalence of Resistance in Microorganisms Testing the Presence of Resistance Genes in Oral Microbiomes and Equine Parasites.

Assessment Rubric

Annual Assessment Rubric — 13.000 pts 86.67%

	3.000 Assessment Reflects Best Practices	2.000 Assessment Meets the Expectations of the University	1.000 Assessment Needs Development	0.000 Assessment is Inadequate	N/A
Learning Objectives weight: 1.000	• Detailed, measurable program learning objectives • Objectives are shared with students and faculty	• Measurable program learning objectives. • Learning objectives are available to students.	• Program learning objectives are identified and are generally measurable	• Program learning objectives are not clear or measurable	N/A
Comment:					
Assessment Measures weight: 1.000	• Multiple measures are used to assess a student-learning objectives. • Rubrics or guides are used for the measures. • All measurements are clearly described. • External evaluation of student learning included.	• Assessment measures relate to program learning objectives. • Various measures are used to assess student learning. • Measures chosen provide useful information about student learning.	• Assessment focuses on class content only. • Minimal description of how the assessment relates to the objective. • Minimal assessment measures established.	• Assessment measures not connected to objectives. • Assessment measures are not clear. • No assessment measures are established.	N/A
Comment:					
Assessment Results weight: 1.000	• All objectives are assessed annually, or a rotation schedule is provided. • Data are collected and analyzed to show learning over time. • Standards for performance and gaps in student learning are clearly identified.	• Most objectives assessed annually. • Data collected and analyzed showing an annual snapshot of student learning. • Data are used to highlight gaps in student learning. • Some data from non-course based content.	• Data collected for at least one program objective. • Data collection is incomplete. • Gaps in student learning not identified. • Lacking external data to support course data.	• Learning objectives are not routinely assessed. • Routine data is not collected. • No discussion on gaps in student learning. • No use of external data to support student learning. • Assessment data not yet collected.	N/A
Comment:	Great points discussed in the analysis of the data provided within the program. The MFT with the incoming students being administered at the beginning of the term will give you a truer picture of the incoming student knowledge base to provide for a more accurate "knowledge added" score on the Senior evaluation.				
Faculty Analysis and Conclusions weight: 1.000	• Data is shared that incorporates multiple faculty from the program. • Discussions on data results incorporate multiple faculty. • Opportunities for adjunct faculty to participate. • Includes input from external sources when possible.	• Multiple program faculty receive assessment results. • Assessment results are discussed • Specific conclusions about student learning are made based on the available assessment results.	• Minimal faculty input about results is sought • Data not used to determine success or not to the objective. • Minimal conclusions made.	• Faculty input is not sought. • Conclusions about student learning are not identified. • N/A Program recently started or too few graduates to suggest any changes.	N/A
Comment:					
Actions to Improve Learning and Assessment weight: 1.000	• All assessment methods, timetable for assessing, and evaluating the effectiveness modifications are included. • Changes to assessment are inclusive of multiple faculty. • Description of changes is detailed and and linked to assessment results.	• More than one change to assessment is proposed, timetable for assessment, and evaluating the change is provided. • Changes to assessment measures is highlighted. • Changes are realistic, with a good probability of improving learning or assessment.	• At least one change to improve learning or assessment is identified. • The proposed action(s) relates to faculty conclusions about areas for improvement. • Adjustments to the assessment are proposed but not clearly connected to data	• Lacking actions to improve student learning. • Actions discussed lack supportive data. • Lacking discussion of the effectiveness of the assessment plan	N/A
Comment:					



Biology BS Annual Assessment 2018-2019

Annual Assessment 18-19

Biology BS

Program Profile

Program Mission Statement
Please insert your program mission statement here

A professionally oriented program with two concentrations specifically designed to both educate students in the biological sciences and prepare them for acceptance into graduate or professional programs.

Program Data

Delivery Method

Traditional On Campus (selected)
Online
Hybrid

Students Majors 2017-18	Student Majors 2018-19
57	65

Concentrations 2017-18
If your program contains concentrations, please list the concentrations and the number of students identified within each concentration.

Pre-Med Concentration

Pre-Vet Concentration

*There is a discrepancy between the total number of concentrations (14 PreVet and 21 PreMed) resulting in 35 majors, yet the number of declared B.S. majors being 57.

Concentrations 2018-19
If your program contains concentrations, please list the concentrations and the number of students identified with each concentration.

Pre-Med Preparation - 23 students

Pre-Vet Preparation - 22 students

Pre-Nursing Preparation - 3 students

*There is a discrepancy between the total number of concentrations (23 PreMed, 22 PreVet and 3 PreNursing) resulting in 48 majors, yet the number of declared B.S. majors being 65

Student Demographics
What are the program goals for student retention, persistence and degree completion? What do the persistence numbers mean to the faculty in the program? Are your persistence numbers what you expected? If not, how could the numbers be

improved? What is the optimal enrollment for the program?

Our Department has a program goal of 75% retention between freshman and sophomores, a 90% persistence per year, and with a 100% completing the program that enter their senior year.

The retention data shows that 81.3% for students that entered during 2017/2018, so we clearly met our benchmark, but were slightly below the University's 83.1% retention rate. This slightly smaller retention rate than the University may be due to large about of faculty turn over the Science program has seen over the last several years and a chaotic start to the 2017/2018 academic year.

By our program goal mentioned above, we would expect a graduation rate ~60%. The current data shows a graduation rate of 75.0% for new students who entered 2012/2013, showing even though we have had a high amount of faculty turn over the last several years, we were successful at graduating the students we did retain at a much higher rate than the University's 57.5% graduation rate.

*Due to the fact the PreNursing Concentration was only meant to be a "holding spot" for PreNursing students as the BSN program was being developed, we know down the line this will affect our retention rates and our graduation rates. The current three PreNursing students never intended to complete a BS degree in Biology, as their goal was to apply for acceptance in the WWU BSN program once approved. As there is now a PreNursing BA degree, all new incoming "PreNursing" students will be placed into that program; therefore, the "PreNursing Concentration" will removed from the BS Biology Degree program, thus affecting future retention and graduation rates. We noted the PreNursing Concentration here so when the problem occurs in the future, it is clear why we "lost" those students.

Is the Program Externally Accredited

Yes
No (selected)

External Accreditation
Name the Accrediting Agency or entity including the last review/approval. Is there an accrediting body for the field of study? If yes, what is the name of the group. Is the program seeking accreditation?If no, why?

N/A

Marketing Materials
Please reflect on the current marketing materials used for the program. Detail what documents you are reviewing and attach a screenshot of any webpages or materials that you cannot include as a document. What changes, if any should be made to the material? Are there recommendations for how or where to market the program?

We know new marketing material is being produced - and we will gladly review and comment any material we receive from marketing to review. The Biology faculty worked most of the fall with Jen Garcia to develop a new Biology flyer/face sheet; however, the new "Flourish in Biology" billboard rolled out this Academic year without any knowledge, input, or review from the Biology Faculty. Ashely Brown did come and talk at one of our School meetings during the Spring semester and has had some individual talks with Biology Faculty, so we feel things may improve.

Marketing Material

~ NA

Program Assessment

Standard/Outcome

Identifier	Description
WWU2016.1	Major Field Competence: Students will demonstrate excellence in an academic or professional discipline, and engage in the process of academic discovery.
WWU2016.2	Ethics: Students will exhibit values and behaviors that address self- respect and respect for others that will enable success and participation in the larger society.
WWU2016.3	Self-Liberation: Students will develop an honest understanding and appreciation of themselves and others resulting in an ability to make individual decisions.
WWU2016.4	Lifelong Education: Students will possess an intellectual curiosity and desire for continual learning both within and beyond formal education in preparation for participation in a global society.

Additional Standards/Outcomes

Identifier	Description
BIO Pre-Med.5	Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.
BIO Pre-Vet.5	Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.
BIO.1	Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept - evolution from common ancestry _ in the unity of numerous biological processes among species.
BIO.2	Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.
BIO.3	Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
BIO.4	Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.

General Education Alignment to Program
How do the General Education criteria align with the Program Objectives? What courses within your program build upon skills learned in general education courses (please list the program course and the general education criteria). The General Education clusters are: Critical Analysis, Creative Expression, Quantitative Inquiry, and Society & the Individual. See attached for more detailed breakdown.

Critical Analysis: (9 credit hours) – *Students apply logical and analytical reasoning skills to diverse source materials in the interest of discerning and debating aesthetic, thematic, and ethical content.*

In all biology coursework, students are expected to integrate sound logical arguments with the scientific method. Students are expected to analyze and interpret general textbooks, primary scientific literature, and data. Throughout biology courses, students are expected to articulate the ethical interface of scientific practice and general societal issues, as well demonstrate integrity in their own scientific communications (oral and written).

Creative Expression: **(12 credit hours) – *Students develop the ability to express ideas and concepts, both logically and creatively, through written, oral, reflective, and aesthetic practices utilizing various media forms.***

In all biology coursework, students are expected to demonstrate creative and independent generation of ideas based upon scientific parameters that they are presented, *e.g.* independently generating novel hypotheses regarding specific

issues that they might be given. Students are expected to prepare and perform presentations on content-specific topics, in addition to extensive written technical papers and essays.

Quantitative Inquiry: (10 credit hours) – ***Students will develop and practice quantitative problem-solving skills in order to analyze and critically evaluate information in a larger context.***

Quantitative inquiry is the foundation of the entire biology program. In all biology coursework students are expected to analyze data, evaluate it critically, and to be able to generate and interpret statistics. Math courses provide students with the quantitative background to perform these activities.

Society & the Individual: (12 credit hours) – ***Students integrate knowledge to articulate an understanding of diverse cultures, historical contexts, and human behaviors.***

In all biology coursework students are expected to apply their knowledge of human behavior in the context of molecular to organismal processes (*e.g.* how the human body works and thinks) in addition to the formation of new scientific ideas. Students are expected to be able to articulate that there are variable correct interpretations of authoritative scientific principles and demonstrate competency with the historical development of scientific principles – that the natural process of scientific development involves building upon the ideas of scientific progenitors.

GE_Cluster_Descriptions_FINAL_Version_Approved.docx

Curriculum Map

A - Assessed
R - Reinforced
I - Introduced
M - Master

Bachelor of Science - Core Assesment(Imported)(Imported)

	BIO 114	**BIO 115**	**BIO 124**	**BIO 231**	**BIO 310**	**BIO 330**	**BIO 401**	**BIO 450**	**CHM 114**	**CHM 124**	**CHM 314**	**PHY 201**	**PHY 212**	**SPR**
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	I	A	R	R	R	R	A, M							A
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	I, A	A	R	R	R	R	R		I	R	R	I	R	A
BIO.3 Diversity in structures, functions, and systems:	I	A	A, R	R	R	R	M		I	R	R			A

Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.														
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	I	A	R	A, R			R							A

Biology BS: Pre-Med Concentration

	BIO 313	**BIO 317**	**CHM 324**	**CHM 440**	**MAT 124**	**MAT 214**	**MAT 304**	**BIO 450**	**SPR**
BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.	R	R	R	R	R	R	R	A, M	A
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	R	R							
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	R	M	M	R	R	R		
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	M	M	R	R					
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	R	R	M	M					

Biology BS: Pre-Vet Concentration

	BIO 303	CHM 324	CHM 440	MAT 124	MAT 304	EQU 111	EQU 117	EQS 306	EQS 376	EQS 404	BIO 450	SPR
BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.	R	R	R	R	R	I	I	R	R	M	A, M	A
BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.	R							R	R			
BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.	R	R, M	M	R	R			R	R	R		
BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.	M	R	R					M	M	M		
BIO.4 Information and Energy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.	M	M	M					R	R	M		

Changes to Curriculum

Are there any changes made to the curriculum map for this academic year? If so, please describe the program changes

made along with the rationale for why and the impact the change should have on student learning?

No changes were made to the curriculum map.

Biology Faculty will have a discussion before the start of the Fall 2019 semester to determine if any of our required upper division courses should be used for Assessment.

Assessment Findings

Assessment Findings for the Assessment Measure level for Bachelor of Science - Core Assessment

BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.

Assessment Measures

BIO115				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion Major Field Test - Section: III No Benchmark = this test is given to our incoming Biology majors to determine the knowledge baseline for each student for this content area. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine “knowledge gained” from completion of the program. been met yet? Met			
Direct - External Testing	Has the criterion Major Field Test - Section: IV No Benchmark = this test is given to our incoming Biology majors to determine the knowledge baseline for each student for this content area. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine “knowledge gained” from completion of the program. been met yet? Met			

BIO 401				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Quiz/Exam	Has the criterion An assessment specific quiz (BIO401) will be used to ensure that assessment questions are direct and relevant to objective 1. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Not met	43% of the students (n=14) scored 70% or better on the final quiz of the semester assessed	BIO401___Quiz_11.docx	

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Proficiency Written Exam	Has the criterion Students are asked a question regarding some aspect of Evolution in which they must answer based on the knowledge they have gained through various Biology Courses. Benchmark: 70% of students scoring 3/5 or higher on interview questions been met yet? Not met	Only 16.7% of the students (n=18) scored a 3.0 or higher (scale 1 -5) on this written question	VIA_BS_SPD_Interview_Exam_Assessment.xlsx	- Refine Assessment Tool: Write better assessment question, put a two paragraph or minimum word count on the questions to try to get our students to write more, thorough answer
Direct - External Testing	Has the criterion Major Field Test - Section: III Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 46 or higher. been met yet? Not met	79% of our students (n=14) scored a 46 or higher on Section III of the MFT and the average score for those students was 48.7. One falls above and one below the benchmark. Three students scoring low on this section pulled down the average.		- Revise Program Benchmark: We note this “Not Met” but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.
Direct - External Testing	Has the criterion Major Field Test - Section: IV Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Not met	71% of our students (n=14) scored a 51 or higher on Section IV of the MFT and the average score for those students was 49.8. One falls above and one below the benchmark. Three students scoring low on this section pulled down the average.		- Revise Program Benchmark: We note this “Not Met” but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.

Assessment Measures

BIO114				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Quiz/Exam	Has the criterion Questions from the First Lecture Exam (BIO114) that were relevant to objective 2 were selected for assessment. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Met	91% of the students were proficient or better (n = 68)	Assesment_questions_Bio_114_exam_1.docx	

BIO 115				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion Biology Major Field Test - Section: I No Benchmark = this test is given to our incoming Biology majors to determine the knowledge baseline for each student for this content area. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine “knowledge gained” from completion of the program. been met yet? Met	There was no benchmark for this as it is a baseline for future assessment		

Direct - External Testing	Has the criterion Major Field Test - Section: II No Benchmark = this test is given to our incoming Biology majors to determine the knowledge baseline for each student for this content area. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine "knowledge gained" from completion of the program. been met yet? Met	There was no benchmark for this as it is a baseline for future assessment		

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion Major Field Test - Section: I Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Not met	79% of our students (n=14) scored a 51 or higher on Section I of the MFT and the average score for those students was 52. One falls above and one below the benchmark.		- Revise Program Benchmark: We note this "Not Met" but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.
Direct - External Testing	Has the criterion Major Field Test - Section: II Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Not met	Only 57% of our students (n=14) scored a 51 or higher on Section IV of the MFT and the average score for those students was 52.9. One falls at (we are considering the 52.9 a 53 = Met) and one below the benchmark.		- Revise Program Benchmark: We note this "Not Met" but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.

Assessment Measures

BIO 115				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the**	**Improvement Narratives**

			Assessments	
Direct - External Testing	Has the criterion Biology Major Field Test - Section: I No Benchmark = this test is given to our incoming Biology majors to determine the knowledge baseline for each student for this content area. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine “knowledge gained” from completion of the program. been met yet? Met	There was no benchmark for this as it is a baseline for future assessment		
Direct - External Testing	Has the criterion Biology Major Field Test - Section: II No Benchmark = this test is given to our incoming Biology majors to determine the knowledge baseline for each student for this content area. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine “knowledge gained” from completion of the program. been met yet? Met	There was no benchmark for this as it is a baseline for future assessment		
Direct - External Testing	Has the criterion Biology Major Field Test - Section: III No Benchmark = this test is given to our incoming Biology majors to determine the knowledge baseline for each student for this content area. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine “knowledge gained” from completion of the program. been met yet? Met	There was no benchmark for this as it is a baseline for future assessment		

BIO 124				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Quiz/Exam	Has the criterion An assessment specific quiz (BIO124) will be used to ensure that assessment questions are direct and relevant to objective 3. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Met	80% of the students (n=39) scored 70% or better on the final quiz of the semester	BIO124___Quiz_11.docx	

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Proficiency Written Exam	Has the criterion Students are asked a question regarding some aspect of Molecular structure in which they must answer based on the knowledge	Only 38.9% of the students (n=18) scored a 3.0 or higher (scale 1 -5) on this written question. Student score was the average from		- Refine Assessment Tool: Write better assessment question, put a two paragraph or minimum word count on the questions to try to get our students to write

	they have gained through various Biology Courses. Benchmark: 70% of students scoring 3/5 or higher on interview questions been met yet? Not met	three separate Assessor scores.		more, thorough answers to the question
Direct - External Testing	Has the criterion Major Field Test - Section: I Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Not met	79% of our students (n=14) scored a 51 or higher on Section I of the MFT and the average score for those students was 52. One falls above and one below the benchmark.		- Revise Program Benchmark: We note this "Not Met" but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.
Direct - External Testing	Has the criterion Major Field Test - Section: II Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 51 or higher. been met yet? Not met	Only 57% of our students (n=14) scored a 51 or higher on Section IV of the MFT and the average score for those students was 52.9. One falls at (we are considering the 52.9 a 53 = Met) and one below the benchmark.		- Revise Assignment for Assessment: We note this "Not Met" but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.
Direct - External Testing	Has the criterion Major Field Test - Section: III Benchmark = Average score of 53 or higher on section, with 60% of students scoring a 46 or higher. been met yet? Not met	79% of our students (n=14) scored a 46 or higher on Section III of the MFT and the average score for those students was 48.7. One falls above and one below the benchmark. Three students scoring low on this section pulled down the average.		- Refine Assessment Tool: We note this "Not Met" but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

BIO.4 Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.

Assessment Measures

BIO 115				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the**	**Improvement Narratives**

			Assessments	
Direct - External Testing	Has the criterion Major Field Test - Percentile Rank (This scores students in all 4 sections of the MFT) No Benchmark = this test is given to our incoming Biology majors to determine the baseline for each student for the exam. Biology Majors will retake the Major Field Test exam as exiting seniors and scores will be compared in order to determine “knowledge gained” from completion of the program. been met yet? Met	There was no benchmark for this as it is a baseline for future assessment		

BIO 231				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Quiz/Exam	Has the criterion An assessment specific quiz (BIO231) will be used to ensure that assessment questions are direct and relevant to objective 4. The benchmark is 70% of the students at Proficient or better. Proficient is defined as 70% or better on the assessed questions. been met yet? Met	87.5% of the students were proficient or better (n = 24)	Genetics_Class_Assessment_Quiz_Fall_2018.docx Genetic_Class_Assessment_Quiz_Data_Fall_2018.docx	

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion Major Field Test - Percentile Rank (This scores students in all 4 sections of the MFT) Benchmark = 50% of students scoring in the 50th percentile or higher. been met yet? Met	57% of our students (n=14) scored at or above the 50th percentile on the Major Field Test as a whole on the MFT Student improvement - We had 3 students the Senior MFT was their second MFT, and so we can begin to look at “knowledge gained/added” Average change (n=5) improved 23 percentile points. All students took the baseline test in February 2017. Median change (n=5) improved 27 percentile points.		- Revise Program Benchmark: Now that we have students who will have taken this MFT as a "freshmen" and as an outgoing senior, we need to determine what our benchmark will be for "knowledge gained/added"

Assessment Findings for the Assessment Measure level for Biology BS: PreMed Concentration

BIO Pre-Med.5 Construct a competitive candidacy for admission to undergraduate medical studies: integrating a strong academic record, proof of observation of medical practice, and identification of other medical school specific admission factors that the individual student must meet.

Assessment Measures

BIO 450				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion 75% or greater of the student interview responses will be satisfactory or better. been met yet? Met	100% of the students (n=10) had interview responses that were satisfactory of better		
Direct - Class Assignment	Has the criterion 100% of students produce a professional CV or Resume been met yet? Met	100% of the students (n=10) have a professional CV or Resume		

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Indirect - Survey of Students	Has the criterion 60% of students actively participating in shadowing or other volunteer roles that will make them competitive for jobs in the medical and human healthcare related jobs and professional programs. been met yet? Met	67% of our PreMed students (n = 9) have had at least one shadowing experience in the last year	Shadowing_for_Biology_BS_SPR_2018_2019_Activity_Assessments_Per_Group_Member_05_08_2019_171012.xlsx	

Assessment Findings for the Assessment Measure level for Biology BS: PreVet Concentration

BIO Pre-Vet.5 Construct a competitive candidacy for admission to undergraduate Veterinary medical programs integrating a strong academic record, proof of observation of veterinary practices in two or more areas of the veterinary animal categories, and identification of other vetrinary school specific admission factors that the individual student must meet.

Assessment Measures

BIO 450				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Interview	Has the criterion 75% or greater of the student interview responses will be satisfactory or better. been met yet? Met	100% of the students (n=10) had interview responses that were satisfactory of better		
Direct - Class Assignment	Has the criterion 100% of students produce a professional CV. been met yet? Met	100% of the students (n=10) have a professional CV or Resume		

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Indirect - Survey of Students	Has the criterion 60% of students actively participating in shadowing veterinarians and/or volunteering in other animal care avenues to make them competitive for applying to veterinarian schools. been met yet? Met	100% of our PreVet students (n = 9) have had at least one shadowing experience in the last year		

Analysis of the Assessment Process

Describe your assessment process; clearly articulate how the program is using course work and or assessment day activities for program assessment. Note any changes that occurred to that process since the previous year. Discuss what activities were successful at assessment and which ones were not as helpful and why. Please include who met to discuss the changes (unless you are a program of one person) and when you met. – Include a discussion on the process for collection and analysis of program data.

The three Biology faculty compiled this report: Dr. Kimberly L. Keller, Dr. Robin Hirsch-Jacobson, and Dr. Sarah Greenland-White.

There major areas in which our majors did not meet the benchmark for our Objectives. Summaries and improvement narratives are included under each assessment field within this report. The main areas where our students fell short of the benchmark were the cohort scoring an average score for the cohort on three sections of the Major Field Test (1, 3, & 4); 60% of the students scoring a 51 or higher on section 2 of the Major Field Test; and the Direct Written questions connected to Objectives 1 and 3.

The Major Field Test (MFT) was given to our graduating seniors during Student Performance Days in February. We have struggled in past years with the amount of effort our students gave for this exam; however, we do not feel this was the case this year. We feel the scores reflect the type and level of work the faculty have seen of these students in the classroom. We also need to realize the cohort size for the B.A. seniors this year was only one student, and therefore we choose to use the data for all the Biology Majors for the MFT data making a cohort of 14. Based on the MFT of the Biology Senior students, the average score for the cohort per section did not meet the benchmark of a cohort average of 53 or higher (Sections 1, 3 & 4 of MFT) and they also did not meet the benchmarks of 60% of students scoring a 51 or higher (Sections 2 MFT). We were rather pleased the benchmark of 50% of students scoring at the 50th percentile rank or higher (Objective 4) was also "Met" this year, showing the students overall performed well on the exam. While we will have discussions to determine if there are ways to how to best use the MFT to assess student knowledge and the effectiveness of the program; we do acknowledge the fact that a poor score by one or two students has the ability to really pull down the average score for a given section. One idea the Biology faculty are considering is using a "median score" of 53 instead of the "average score" of 53 as our overall cohort tend to be small (< 20 students of graduating seniors, both BA and BS) with often with a single outlier. When looking at the graduating seniors as a whole (both B.A. and B.S.), it appears the benchmark is satisfactory for the MFT. This problem strongly supports the usefulness of determining "knowledge added" assessment by determining "value added" to their score on the MFT we plan to assess in the near future that much more important. This year we had five senior biology seniors that had taken the MFT earlier in their undergraduate years, so we did calculate "knowledge/value added" for these 5 students. The average change was an improvement of 23 percentile points, with the median change being an improvement of 27 percentile points. We were quite impressed with these improvement scores, as one of the five students was our low score outlier in all areas of the MFT. Next year we should have a larger group of students to look at "knowledge/value added" and so Biology faculty will use the scores of the freshman students and this cohort to help set our benchmark for the "knowledge/value added." This is the third year we have had our incoming Biology Majors take the MFT; however, this is the second year we had them take the exam literally as they are entering the program. All incoming Biology Majors took the MFT during the third week of classes in the fall semester in BIO115, the laboratory associated with BIO114. As the data are for collection purposes only at this point, there is no benchmark attached to the scores for our "freshman." Our long-term assessment plan for the program will occur when these same students take the MFT as an outgoing senior and then we will be able use the scores on the two exams to determine "value added" of each graduating student in the Biology Program at William Woods University. The Biology faculty are excited about adding this new level of assessment of our seniors. These data could show that while an outgoing senior may not meet the benchmarks of the MFT when comparing it to the national scores (our current assessment), the same student may improvement in their score, showing the program was successful as a whole as there would be a definite "value added" assessment.

Our cohort for combined sophomores and juniors was 18 students. The overall low the scores of the Direct Written Exam questions for Objective 1 and Objective 3 by all of our Biology students who participated in this assessment surprised us, as it was "Not Met" for our BA and our BS students. Overall, the BS students cohort scored very low on these Objective Question (16.7% and 38.9%, respectively), so they really failed to meet the benchmark of 70% scoring a >3 on each question. This year we tried something different and instead of interviewing the students we had them write their answers using our VIA assessment software. Then the three Biology faculty each assessed the student answers individually and the average of those three scores was used to determine if the student "Met" the >3 benchmark on each question. Even though overall the performance was well below our expectations for these students, we still feel this is a valuable assessment. The Biology faculty have talked and realize part of the problem is the wording of the questions used in this year's assessment, and changes will be to further questions to try to eliminate the lack of focus in their answers. Second, a paragraph and/or word minimum will be added to the VIA assignment to help students write a more complete answer. We addressed this in the Student performance Day section of the report, but the one problem with making these Direct Written Questions and not an Interview, is we have now eliminated the one time we had to 'check-in" with students and talk with them about things outside their course to make them successful. We will have further discussions about the importance of that component and if it feasible to do both a Direct Written Exam and a Direct Interview during Student Performance Review Days.

After completing the Direct Written Exam questions for Objective 1 and 3, the students also took an Indirect Student Survey using VIA with questions inquiring what the students are doing "outside of their coursework" to make them competitive in the next stage of their career. The shadowing data the survey collected showed that 67% of our PreMed students and 100% of our PreVet students have had at least one shadowing experience in the last year. However, several students did remark they missed having a specific time to interview/check in with the Biology faculty about their progress in obtaining the appropriate shadowing, volunteering, and internships to make them competitive. We will need to discuss if there is a way we could provide an "optional" interview time with faculty for those students wanting that type of input.

In terms of class assessment, the faculty this year made a concerted effort to have a specific quiz or wrote specific exam questions that more specifically addressed assessing the objective. Overall, this approach worked very well and the only failure to meet the benchmarks was the quiz in BIO401. A lack of understanding of vocabulary used in the quiz was the cause of “Not Met.” The vocabulary was not part of the assessment and the faculty has already addressed the issue for the upcoming assessment year. As a whole, writing specific objective based questions showed an increase in our assessment numbers.

Due to some major conflicts with our teaching schedules, weekly department meetings with all three Biology faculty took place much less frequently throughout the academic year than in years past. We mainly use of 100- and 200-level classes and the MFT for our assessment and have very few upper division courses as part of our assessment of the Biology Program. Current discussions during the generation of this report is that we may begin to assess at least one of our objectives (possibly Objective 3) using the required Field courses and now that we have a full-time faculty teaching the required Anatomy & Physiology courses, Physics courses, and Chemistry courses, we may want to consider assessing those as well. A comprehensive review of our Curriculum and Assessment maps will occur prior to the fall 2019 semester to make some possible changes to ensure everyone is satisfied with their respective course-specific components of the assessment of the program.

For a professions-oriented mission statement, we are satisfied with current preparation of our students, especially when you look at where our students are matriculating following graduation. Therefore, we feel only minor changes in our assessment are needed to accurately measure success of the Biology Program. Although we do feel strongly that writing one Assessment Report and combining the B.A. and B.S. students would be a much truer assessment of the Biology program as a whole.

Improvement Narrative List

Assessment Findings for the Assessment Measure level

Standard/Outcome	BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - Proficiency Written Exam
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	**Summary**
Refine Assessment Tool	Write better assessment question, put a two paragraph or minimum word count on the questions to try to get our students to write more, thorough answer

Standard/Outcome	BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
Legend	A
Course/Event	Student Performance Review
Assessment	Direct - External Testing

Measure	
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Revise Program Benchmark	We note this “Not Met” but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

Standard/Outcome	BIO.1 Evolution: Articulate knowledge that life evolved over time via mechanisms of mutation, natural selection, and genetic drift, and that there is concrete evidence for this fundamental concept _ evolution from common ancestry _ in the unity of numerous biological processes among species.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Revise Program Benchmark	We note this “Not Met” but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

Standard/Outcome	BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	

Improvement Type	Summary
Revise Program Benchmark	We note this “Not Met” but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average

	of the group.

Standard/Outcome	BIO.2 Interdisciplinary: Demonstrate that fundamental principles and laws of chemistry and physics are also underpinnings that govern complex living systems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	**Improvement Type**: Revise Program Benchmark **Summary**: We note this “Not Met” but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - Proficiency Written Exam
Assessment Findings	Not met
Improvement Narrative	**Improvement Type**: Refine Assessment Tool **Summary**: Write better assessment question, put a two paragraph or minimum word count on the questions to try to get our students to write more, thorough answers to the question

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	Student Performance Review

Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	**Improvement Type**: Revise Program Benchmark **Summary**: We note this “Not Met” but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	**Improvement Type**: Revise Assignment for Assessment **Summary**: We note this “Not Met” but are fine with our benchmarks, but may consider changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

Standard/Outcome	BIO.3 Diversity in structures, functions, and systems: Demonstrate and model, through reductionist and holistic approaches, the interconnectedness of life along a continuum from molecular structures to interactions among organisms and with ecosystems.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Not met
Improvement Narrative	**Improvement Type**: Refine **Summary**: We note this “Not Met” but are fine with our benchmarks, but may consider

	Assessment Tool: changing second part of benchmark to median instead of average to keep a low score by a single student from having such a large effect on the average of the group.

Standard/Outcome	BIO.4 Information and Engergy: Demonstrate knowledge of major conserved metabolic, signaling, heritable, and molecular processes of all life on Earth.
Legend	A
Course/Event	Student Performance Review
Assessment Measure	Direct - External Testing
Assessment Findings	Met
Improvement Narrative	**Improvement Type**: Revise Program Benchmark **Summary**: Now that we have students who will have taken this MFT as a "freshmen" and as an outgoing senior, we need to determine what our benchmark will be for "knowledge gained/added"

Program Activities

Student Performance Review

Describe the department assessment day activities if not already described previously. Please articulate the nature of the assessments are conducted, explain the process for assessment that happens on these two days. Include the schedule of assessment day for your program. What does the data and outcomes tell you? What changes will you make as a result of the data? What areas are successful for the program?

We use Student Performance Days to have our senior students take the Major Field Test (MFT) in Biology. Since the BA only had 2 students take the MFT this spring, we combined the BA and BS cohorts so we had 14 students. We are considering changing our benchmark from the “average score” to the median score” to help eliminate some of the issues when one student does poorly on the MFT.

This academic year, we were able to administer the MFT to the incoming class of Biology Majors in the fall by doing it the second week of classes in the fall semester in BIO115, the laboratory associated with BIO114. This change was made in order to truly capture the entry level knowledge base of each of our incoming students majoring in Biology. We did have a few students (n=5) that in taking the MFT as a Senior was their second time taking the MFT, so for those few students we did generate “knowledge gained/added.” As the group was so small, we choose not to separate out the one student that was a BA and entered the data for the whole group. The median change in the total MFT percentile score for this sub-group of students (n=5) improved 27 percentile points, with an average change of 23 percentile points. As we move forward, this will become an important part of our assessment and so we need to do a better job of tracking our BA students versus our BS. We will need to determine what we feel the Benchmark will be for this portion of our assessment. This data will be a valuable assessment in addition to our current use of the MFT to evaluate the knowledge of our exiting seniors compared to other Biology majors on a national level. The data generated in BIO115 is being used simply as an entry-level baseline. There is no benchmark for this data and “Met” simply implies all students declared as

majors at that time took the MFT. The results of the MFT for those students is being placed here as evidence the data was collected, even though it occurred in the fall of 2018 and will not officially be utilized for a few years.

With the moving of the testing of incoming students to the fall, our incoming students Student Performance Day activities involved three separate 30 minute Breakout Sessions, one for each of our Biology Degree Programs. All incoming Biology students were required to attend Breakout Sessions specific to their degree in Biology in which requirements of their Major were discussed, as well as a Question & Answer session about their major, jobs, and other related issues.

We changed our interviews of our "sophomore and junior" level students to a Direct Written Question for Objective 1 and Objective 3. This year, in order to assess students on a more equal level, we only had one question per objective for students to answer, thus eliminating any question bias. For each written answer, all three of the Biology faculty assessed and scored the student answers separately, and then the average score used to assess the student's performance for that objective. This year all of our Biology students did poorly on this Direct Written Questions portion of assessment, and did not meet the benchmark associated with content related to Objective 1 or to Objective 3. We are confident the assessment scores do not truly reflect the knowledge our students have regarding these two Objective. We know we need to refine our assessment tools and write much more direct questions as well as implement a word/paragraph minimum to help ensure our students write more thorough and better answers next year.

In the past, part of the Individual Interviews also involved questions inquiring what the students are doing "outside of their coursework" to make them competitive in the next stage of their career. Since we removed the questions for the objectives, this year we changed this to an Indirect Student Survey using VIA. Since we collected the shadowing data using VIA, data collection for assessment was much easier; however, several students did remark they missed having a specific time to interview/check in with the Biology faculty about their progress in obtaining the appropriate shadowing, volunteering, and internships to make them competitive. We will need to discuss if there is a way we could provide an "optional" interview time with faculty for those students wanting that type of input.

Every year during Student Performance Days we bring in a Speaker who gives research-based talk to the entire department. We feel it is extremely valuable for our students to witness such talks and we attempt to alternate the area of research presented each year in order to expose our students to the variety of sub-disciplines within Biology during their 4-years here at William Woods. Our students continually provide positive feedback about the speakers and it is common to hear them discussing the talk amongst themselves for the next several days. We plan to continue this as part of our student performance days. We again held a Meet & Greet/Question & Answer reception after the seminar for students to interact with the speaker, and that was well attend and successful. Therefore, it is definitely something we will continue to incorporate that into our Student Performance Day schedule.

This year we incorporated a new event "Impartation of Wisdom" lunch for just our new, incoming students and our outgoing seniors. Over pizza, new majors had the opportunity to talk freely with the seniors about the program, courses, faculty, and anything else they wanted to discuss. This was a faculty-free event designed to help ease some of the concerns new students may have about the program, and overall it went well. There were a few schematic issues of how the event proceeded, in terms of ensuring interactions between freshman and seniors, but we will address those next year. The Biology faculty feel this is definitely an event worth keeping as part of Student Performance days.

Overall, we are very pleased with our Student Performance Days and feel we have a schedule that allows us to assess our students in a variety of manners, and the small changes mentioned above will only serve to better our assessment efforts of the Biology program

Student Performance Review Schedule

Upload the program schedule for students during Performance Reviews.

Student_Performance_Days_Schedule___Spring_2019.pdf

Senior Showcase

Describe program Senior Showcase activities if not detailed previously in the report? What benefit does the program gain from the activities? What if any assessment of students happens during this event? What changes if any will occur due to what is learned by faculty on Senior Showcase?

We had 13 students present a poster at the Senior Showcase on Tuesday and Thursday, April 16 and 18, 2019

Assessment Rubrics
Upload rubrics used for Senior Showcase or Student Performance Reviews for student assessment.

Service Learning
Does the Program include projects/ course content that uses the philosophy of service learning?
Yes
No (selected)

Service Learning Component
If so, how is service learning infused in the coursework within your department? Is service or community engagement in the program mission? Describe the Service Learning Activities that your students and department engaged in this past year. How did the activities improve student learning? How did the activities benefit the community?

LEAD Events
Highlight lead events sponsored by program faculty that are connected to program or general education objectives for the past academic year. Include a total number of lead events program faculty sponsored.

Robin Hirsch-Jacobson (5 LEAD Events)
1. Plants, Animals and Pollution - Join Conservation Club with interactive stations regarding native wildlife interactions, recycling/pollution and a knowledge of Missouri's native flora and fauna. Wednesday, October 10, 2018, 6:30:00 PM, 300 Science & Language Bldg. 1 point

2. Plants Are Cool! - With spring here, who doesn't want to know fun plant facts? Join Conservation Club as Professor David Starrett presents about the fun and interesting world of plants. Burton 006, Tuesday, March 26, 2019 1:00:00 PM - 1 point(s)

3. Conservation Club - Participation Credit - LEAD participation credit for Conservation Club. Student Life Office, Tuesday, April 9, 2019 - 1 point(s)

4. Tropical Ecology Presentation - We went to Costa Rica over Spring Break! Come listen to the nine students tell you about the wonderful things they saw learned about the flora and fauna of Costa Rica. This will be in the Ivy Room so feel free to grab lunch and bring it on down! Ivy Room - Wednesday, April 17, 2019 12:00:00 PM -- 1 point(s)

5. Biology Senior Showcase - Check out the graduating Biology majors poster presentations! Drop in at anytime between 12:30 and 1:30. All you'll need is something to write with. Interact with a few of wonderful Biology poster presentations and learn some great information! Again, you can show up at any time during the event! This is in the upstairs lobby of Kemper Art Center. Thursday, April 18, 2019 12:30:00 PM - 1 point(s)

Kimberly L. Keller (4 LEAD Events)
1. STRAWS - A documentary that outlines how billions of non-recyclable plastic straws contribute to landfills, litter streets and wash into oceans. Important questions are raised regarding plastic straw production and use. Also, marine researchers describe how our everyday plastic products end up in the oceans and cause harm to turtles, birds, fish and other sea life. Wednesday, February 27, 2019. 6:30:00 PM – 1 point(s)

2. Pre-Veterinary Club - Participation Credit - LEAD participation credit for Pre Med Club. Student Life Office. Tuesday, April 9, 2019 8:00:00 AM - 1 point(s)

3. Pre Med Club - Participation Credit - LEAD participation credit for Pre Med Club. Student Life Office. Tuesday, April 9, 2019 8:00:00 AM - 1 point(s)

4. Biology Club - Participation Credit - LEAD participation credit for Pre Med Club. Student Life Office. Tuesday, April 9, 2019 8:00:00 AM - 1 point(s)

Student Accomplishments
Highlight special examples of student successes in the field (academic: mentor-mentee, conference presentations, competitive internship, journal acceptance; extra-curricular: horse show championship, art exhibit). This is for any accomplishments that a student achieved outside of course work or the normal expectations of student success.

Ari Arnold - American Midwest Conference's A.O. Duer Scholarship Award winner, Biology Department Distinguished Scholar

Alexis Armontrout	Master of Occupational Therapy, Rockhurst University - Kansas City (Also accepted at Mizzou OT program)
Clare Browning	Business manager equine stable
Emily Tichy	Accepted at Iowa State and Mizzou Vet School, Attending Mizzou
Taylor Woods	Oklahoma State University Vet School

Alumni Accomplishments
Please highlight special examples of any successes of recent graduated alumni (acceptance or graduation graduate school, employment or professional milestones. Include recent graduates.

Alexis Bailey (2017) – Accepted to the University of Arizona College of Medicine – Phoenix, start date of Fall 2019

Maddie McMahill (2017) – Started the Master of Public Health with an Emphasis in Veterinary Public Health at the University of Missouri, January 2019

Ryan Schmidt (2016) – Started Doctoral Program in Physical Therapy at the University of Missouri, Fall 2018

Hallie Peters (2016) – Accepted into College of Veterinary Medicine, Midwestern University, Glendale, AZ, start date of Fall 2019

Faculty Accomplishments
Highlight special examples of faculty success in the profession/field/content area. This is for any accomplishment of a faculty activity/research/professional nature.
Robin Hirsch-Jacobson received the Louis D. Beaumont Dad's Association Distinguished Professor Award for Excellence in Teaching at the university's academic honors convocation April 27, 2019

Kimberly L. Keller received the Cox Distinguished Professorship in Science for 2018-2019. Stinson Creek – An Impaired Waterway, A Collaborative Research Study Testing for the Presence of Escherichia coli and Organic Pollutants along the Small Impaired section of Stinson Creek in Callaway County

Assessment Rubric

Annual Assessment Rubric 2018 — 27.000 pts 69.23%

	3.000 Exceeds	2.000 Meets	1.000 Falls Below Expectations	N/A
Mission Statement Clearly Articulated weight: 1.000	The mission statement for the program is insightful and forward thinking. It aligns with the University Mission and learning objectives showing a clear alignment between the University and the program.	✓ The mission statement for the program clearly articulated and aligned with the University mission.	The mission statement is minimal at best.	N/A
Comment:				
Reflection on Retention weight: 1.000	The program provides a detailed description on the retention numbers. The program provides new ideas on how to improve retention of their program students or articulates what they are currently doing to keep students in their program.	✓ The program provides a basic reflection on the retention data provided.	The program does not reflect on retention data in a detailed way.	N/A
Comment:	Generally good here. More detail on retention, concentrations, and marketing, though marketing especially needs to be revisited.			
Defines External Accreditation Standards weight: 1.000	The program provides a detailed explanation of the accreditation organizations within the field along with all the timeline and supplemental information required for accreditation.	The program provides a basic explanation of the accreditation organizations in the field.	The program fails to provide any accreditation information.	✓ N/A
Comment:				
General Education alignment clearly explained weight: 1.000	The program provides a detailed explanation of the General Education criterial and how the basic skills learned are expanded upon in the program. Details include but are not limited to: specific courses, or activities that stretch the knowledge of the specific areas.	The program provides a basic explanation of the General Education curriculum and how the skills learned are expanded in program courses.	✓ The program provides a minimal explanation of the General Education curriculum and how the skills learned are expanded in program courses.	N/A
Comment:				
Curriculum Map alignment weight: 1.000	The curriculum map is detailed and complete.	✓ The curriculum map is complete	The curriculum map is not complete	N/A
Comment:				
Assessment of Objectives weight: 1.000	Assessment of objectives are spread out across the curriculum with a variety of assessment measures and each program objective is assessed a minimum of twice a year.	✓ Each objective is assessed a minimum of 2 times a year or an assessment rotation is explained so that all objectives are assessed. The assessments are not concentrated in one class.	The assessment map is not complete or much of the assessment happens in only one course. Not all objectives are assessed annually, nor is a plan provided on assessment.	N/A
Comment:	Like with the BIO BA report, I think the distribution of assessments feels limited-- students assessed at the 100-level and in student performance reviews, but nowhere else?			
Data Driven Decision-making is explained weight: 1.000	Curricular and assessment changes are articulated and validated through data based decisions. Faculty discuss the data that lead to curricular decisions being made.	✓ Curricular and assessment decisions are made based on data provided in assessment, but detailed alignment is not provided as justification for the change.	Changes are proposed and brought forth with little explanation on the data included in the decision, if data was included in the decision.	N/A

Documentation provided on assessment findings weight: 1.000	The program uploads all rubric and support information to support the claims in the assessment findings along with detailed instructions on the assessment process and data analysis.	✓ The program uploads all rubric and support information to support the claims in assessment findings.	The program did not upload the data to support assessment claims in the assessment findings.	N/A
Comment:	There is not an upload that was found pertaining to the data on the MFT assessments. It would be nice to have that as an attachment to help lay out the evidence from the MFT evaluation. There is a detailed discussion of the MFT in the Analysis on Assessment, but the file would be helpful also.			
Analysis of Assessment is complete weight: 1.000	The program completed assessment findings for each component identified, and provided a comprehensive summary of each assessment measure identified in the report.	✓ The program completed the assessment findings for each component and provided a summary for each assessment measure.	The program did not provide a completed assessment findings for each component, nor did they complete the summary for each measure.	N/A
Comment:				
Improvement narratives are selected with intentionality weight: 1.000	The program identified Improvement Narratives that appear to move the program forward and see the bigger picture than only the specific program curriculum options	✓ The program used the provided Improvement Narratives and selected options that made sense to the objectives and issues within the assessment.	The program did not use any improvement narratives, or the ones chosen are not aligned with assessment results.	N/A
Comment:				
Student Performance Review weight: 1.000	The program described and provided a detailed account of Student performance Review activities. Data evidence provided and detailed.	✓ The program provided the schedule and a brief description of Student Performance Review with data of the results.	The program did not provide complete explanation on Student Performance Review nor did they provide data results.	N/A
Comment:				
Senior Showcase weight: 1.000	The program had all senior students participate in Senior Showcase and provided a detailed explanation of their expectation and the presentations presented.	✓ The program described the Senior showcase activities and provided some evidence of what was presented.	Little to no content of Senior showcase was provided.	N/A
Comment:				
Co Curricular activities weight: 1.000	✓ The program detailed the activities of LEAD and other co-curricular programing that was provided throughout the year. They provided numerous events for students.	The program provided a listing of LEAD events and activities provided.	The program provided little to no description of the Co-curricular activities provided throughout the year.	N/A
Comment:				
Faculty, alumni, and Student accomplishments weight: 1.000	✓ The program provided detail updates on successes on Students, Alumni and Faculty with added information explaining the kinds of success that were experienced.	The program provided a listing of information on Students, Alumni, and faculty accomplishments.	The program provided little to no data on students, alumni, faculty accomplishments.	N/A
Comment:				