WILLIAM WOODS
UNIVERSITY

Biology BS Annual Assessment 2021-2022

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Annual Assessment 2021-2022

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

	Student Majors	Student Minors
2020-2021	**62**	-
2021-2022	**42**	-

Concentrations 2020-2021
If your program contains concentrations, please list the concentrations and the number of students identified within each concentration.

Pre-Med Preparation - 27 students

Pre-Vet Preparation - 31 students

Pre-Nursing Preparation - 1 students

*There is a discrepancy between the total number of concentrations (27 PreMed, 31 PreVet and 1 PreNursing) resulting in 59 majors, yet the number of declared B.S. majors being 62

Concentrations 2021-2022
If your program contains concentrations, please list the concentrations and the number of students identified with each concentration.

Pre-Med Preparation - 19 students*

Pre-Vet Preparation - 24 students*

*There is a discrepancy between the total number of concentrations (24 PreMed and 19 PreVet) resulting in 43 majors, yet the number of declared B.S. majors being 42. For several years now there is a discrepancy between the number of declared Biology BS Majors and the number listed in the BS Concentrations.

Due to the fact that the Nursing Program never got fully approved and is no longer being sought as a potential major offered at William Woods, the Pre-Nursing Concentration was finally removed as a possible concentration under the Biology BS.

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 the persistence numbers what the program expected? If not, how could the numbers improve?

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
- Involvment in Clubs

Optimal Enrollment
Considering current human and physical resources, what is the optimal enrollment for the program?
60

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

Admissions and Marketing Materials
Reflect on the current marketing materials used for the program. Please attach screen shots of the website or any material you are referencing in this section. What changes, if any, should be made to the material? Are there recommendations on how to modify the current material?

The Biology faculty have not met without anyone in Admission and/or Marketing in roughly 2 years.

Marketing Material

Program Assessment

Standard/Outcome

Identifier	Description
WWU2021.1	Knowledge and Scholarship: Demonstrate current knowledge and educational expertise in an academic or professional discipline engaging students in the process of academic discovery.

Additional Standards/Outcomes

Identifier	Description
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 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.

Alignment to the University Objectives
Please discuss the Program alignment to the University Objectives. Specific evidence is not to be uploaded, but discussion is expected of the assignment, and intentionality of how the objective is met with program curriculum.

WWU2016.1 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).

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.

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.

WWU2016.3 Self-Liberation: Students will develop an honest understanding and appreciation of themselves and others resulting in an ability to make individual decisions.

Though we help students get and find internships, shadowing hours, and professional work, we do not hold their hand. They must do much of the work themselves, knowing they have us as support. This allows them to safely, and autonomously, make important career and life decisions, building their self-confidence and awareness that they can do it.

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.

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 having experiencing 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 pursuing continual learning even after they graduate.

General Education Alignment to Program
How do the General Education criteria align with Program Objectives? What courses within the program build upon skills learned from general education courses (please list the program course and the general education criteria)? The General Education clusters are attached to the document below.

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

NSSE Objectives Discussed Fall 2019

Program Alignment to NSSE Objectives
How did the program integrate the three NSSE objectives determined by the faculty in the fall of 2019? The objectives were to 1) integrate more interdisciplinary work within the curriculum, 2) to connect learning to societal problems or issues, and 3) to examine the strengths and weaknesses of their (students) own views on a topic or issue. Please articulate which courses, and what assignments were assigned and how the work was assessed. Were the assignments successful? What could have made them more successful?

Our program integrated the three NSSE objectives into individual courses at the discretion of the professor. Illustrative examples of these integrative activities and their assessments are included below. The Biology Faculty will have a discussion prior to the start of the Fall 2021 semester to determine if addressing these NSSE objectives will be best served by continuing to address these individually, or if a program-wide approach to these objectives would better meet the needs of the students.

1) integrate more interdisciplinary work within the curriculum

Dr. Kimberly Keller had a strong push for interdisciplinary work in her classes. Unfortunately, due to COVID, the annual project between her Genetics class (Bio 231/232) with Dr. Antje Heese (Associate Professor) from the Biochemistry Department at the University of Missouri to participating in their research by trying to identify a mutant in the plant, Arabidopsis thaliana, using PCR genotyping. The work is cross-disciplinary and real-life, both aspects that the students found meaningful. The students' work was assessed via lab-report (and questions on the lab exam). This activity is extremely successful both in students' perceptions, and in what they learned from the activities. Dr. Keller plans to re-instate this collaborative learning activity in the 2021-2022.

Similarly, in Dr. Keller's Microbiology class (BIO303/304), our students learn about the "One Health Initiative" through a collaborative lab with Dr. Paul Schiltz and the Equestrian Department learning to do fecal Egg counts on samples from the University equine herd. As above, the interdisciplinary work was exciting to the students who got to see how biology knowledge translates into health initiatives. Dr. Keller's Molecular Biotechnology (BIO414/415) also worked with Dr. Schiltz on a Platlet-Rich Plasma protocol comparison and our students also attempted to identify a antibiotic bacteria from wound on one of the horses that would not heal.

2) to connect learning to societal problems or issues

All of our biology classes connect with societal problems or issues—these range from environmental and conservation issues (strongly addressed in Environmental Science BIO 209, Ecology BIO 330/331) to human medical and ethical challenges (strongly addressed in Genetics BIO 231/232, Microbiology Bio 303/304, Human Anatomy and Physiology BIO 314/314, and Molecular Biotechnology BIO414/415).

While many of these issues are addressed as the naturally arise from the material being learned (e.g. the ethical implications of altering DNA, the role of antibiotic overuse contributing to "superbugs", the interactions of species on each others' survival) we did seek to explicitly connect learning to societal problems or issues.

3) to examine the strengths and weaknesses of their (students) own views on a topic or issue

All of the upper-level biology classes, and many of the lower-level ones, including Gen Bio 1 and Gen BIO 2 (BIO 114/115, BIO 124/125) include a research paper or project. These projects and/or papers are assessed part-way through the course, giving the students feedback on the strength of their mastery and understanding of the topic as well as providing them information about their weaknesses in the area. This method allows students to build on their strengths and address their weaknesses prior to completing their final projects.

This feedback is given by the instructor.

A new activity that directly examined students' own views on topics was done in Human Anatomy and Physiology 2 lab (BIO 324). The students had a whole lab period where they were given a list of anatomical misconceptions, and were required to find at least one that they thought was true, and figure out why it wasn't. Similarly, they needed to explain away at least one misconception that a lab-mate had, as well as explain the reason that certain misconceptions are so prevalent. This was assessed as a lab assignment and was successful as it had students evaluate their own assumptions and investigate the strengths and weaknesses of their ideas. In the future, we anticipate using this direct method of "examine the ideas you have and explain the common errors that are made in this area" could be a valuable teaching method in numerous biology courses.

Curriculum Map

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

Bachelor of Science - Core Assessment

	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 2019.4 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
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: 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	A, R	R	R	R	M		I	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 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	R	R	R		
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					

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 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	R	R			R	R	R		
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,	R							R	R			

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, 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		

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?

Slight changes were made to the curriculum map to align the curriculum map to our current concentration checklists; however, none of the changes to the curriculum map affected the Assessment Map.

Biology Faculty will have a discussion before the start of the Fall 2021 semester about Assessment and 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

Standard/Outcome
BIO 2019.4 Information and Energy: 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 Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion Major Field Test - Percentile Rank (This scores students in all 4 sections of the MFT) There is no score Benchmark = this test is given to our incoming Biology majors to determine the	As 100% of the incoming Biology Major students took the MFT this fall (n=24) (24 students		

	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). Been met yet? Met	= 18 declared and 6 more "want to be Biology majors")		

BIO 231				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	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? Not met	Only 47% of the students received a Proficient (70%) or higher on the Assessment Quiz (n=15).		

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	The Benchmark was Met as 60% of the BS Students scored in the 50th Percentile or higher on the Biology MFT (n=10)	2022_MFT_Data_and_Comparison_for_Knowledge_Gained_REPORT_DATA.xlsx	
Direct - External Testing	Has the criterion Benchmark = 100% of our students will show an increase in their over Percentile Rank when we compare their MFT Percentile Rank as an Incoming Biology Major to their MFT Percentile Rank taken as a graduating Senior been met yet? Met	The Benchmark was Met as 100% of the BS Students that had taken the MFT as Freshman and as Seniors showed a positive gain in their Percentile Rank on the Biology MFT (n=7)		

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.

Assessment Measures

BIO 115				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
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). Been met yet? Met	As 100% of the incoming Biology Major students took the MFT this fall (n=24) (24 students = 18 declared and 6 more "want to be Biology majors")		
Direct - External Testing	Has the criterion 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). Been met yet? Met	As 100% of the incoming Biology Major students took the MFT this fall (n=24) (24 students = 18 declared and 6 more "want to be Biology majors")		

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? Met	The benchmark was Met as 100% of the students were proficient or better (n = 12)	BIO401_Quiz_scores.docx	

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Proficiency Written Exam	Has the criterion Two weeks prior to assessment, students will be emailed a peer-	The Benchmark was Met as 80% of the students	Rubric___Tweener_Response_Evolution_a	- Refine Assessment Tool: We did not give our majors 2 weeks to read the articles. We chose

	reviewed journal article about research in the field of Ecology. On Assessment Day, students will be asked to analyze a specific figure from the article and given 15 minutes to complete the assignment in VIA. Benchmark: 70% of students scoring an average of 3/5 or higher on interview questions been met yet? Met	scored an average of 3/5 or higher on the Article Response Questions. (n=22)	nd_topography_Answer_Key.docx Tweener_Paper_Analysis_Scores___AVG_Scores_DATA_for_Report.xlsx	two short articles and gave the students a minimum of 2 hours to read the articles and answer 7 specific questions about the figures and the data. We plan to move this Assessment to Objective 5 to give more latitude in choosing articles.
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	One benchmark for Section III of the MFT was Not Met and one benchmark was Met. The Average Score for the group was 52 (just shy of the 53 benchmark). However, the benchmark of 60% of the students scored a 46 or higher was Met as 70% of the student scored a 48 or higher. (n=10)		
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	Both benchmarks for Section IV of the MFT were Met as the Average Score for the group was exactly 53 and only 70% of the students scored a 54 or higher. (n=10)		

Standard/Outcome

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 - 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	As 92.9% of the students received a Proficient (70%) or higher on the designated questions on Exam 1 (n=52)		

BIO 115				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion 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). Been met yet? Met	As 100% of the incoming Biology Major students took the MFT this fall (n=24) (24 students = 18 declared and 6 more "want to be Biology majors")		
Direct - External Testing	Has the criterion 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). Been met yet? Met	As 100% of the incoming Biology Major students took the MFT this fall (n=24) (24 students = 18 declared and 6 more "want to be Biology majors")		

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	Both of the benchmarks for Section I of the MFT were Not Met as the Average Score for the group was 49 (not 53) and only 40% (not 60%) of the students scored a 51 or higher. (n=10)		- Revise Program Benchmark: Biology Faculty will verify the material in this section of the MFT is covered in our courses and determine if the benchmark needs adjusted. The Benchmark may need to be changed, because when we look at the Senior Cohort as a whole, only 36% scored a 51 or higher and the average was a 48 (n=14). Data from previous years will also be reviewed in this decision.

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	One benchmark for Section II of the MFT was Not Met and one benchmark was Met. The Average Score for the group was 52 (just shy of the 53 benchmark). However, the benchmark of 60% of the students scored a 46 or higher was Met as exactly 60% of the student scored a 41 or higher. (n=10)		

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.

Assessment Measures

BIO 115				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - External Testing	Has the criterion 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). been met yet? Met	As 100% of the incoming Biology Major students took the MFT this fall (n=24) (24 students = 18 declared and 6 more "want to be Biology majors")		
Direct - External Testing	Has the criterion Biology 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). been met yet? Met	As 100% of the incoming Biology Major students took the MFT this fall (n=24) (24 students = 18 declared and 6 more "want to be Biology majors")		

Direct - External Testing	Has the criterion Biology 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). been met yet? Met	As 100% of the incoming Biology Major students took the MFT this fall (n=24) (24 students = 18 declared and 6 more "want to be Biology majors")		

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? Not met	The Benchmark was Not Met as only 67% of the students received a Proficient (70%) or higher on the Assessment Quiz (n=21)	BIO124_Quiz_scores.docx	

SPR				
Assessment Measure	**Criterion**	**Summary**	**Attachments of the Assessments**	**Improvement Narratives**
Direct - Proficiency Written Exam	Has the criterion Two weeks prior to assessment, students will be emailed a peer-reviewed journal research article in the field of Molecular Structure. On Assessment Day, students will be asked to analyze a specific figure from that article and given 15 minutes to complete the assignment in VIA. Benchmark: 70% of students scoring an average of 3/5 or higher on interview questions been met yet? Met	The Benchmark was Met as 77% of the student scored an average of 3/5 or higher on the Article Response Questions. (n=22)	Tweener_Paper_Analysis_Scores___AVG_Scores_DATA_for_Report.xlsx Rubric___Tweener_Response_Gut_microbiota_Answer_Key.docx	- : We did not give our majors 2 weeks to read the articles. We chose two short articles and gave the students a minimum of 2 hours to read the articles and answer 7 specific questions about the figures and the data. We plan to move this Assessment to Objective 5 to give more latitude in choosing articles.
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?	One benchmark for Section II of the MFT was Not Met and one benchmark was Met. The Average Score for the group was 52 (just		- Revise Program Benchmark: Biology Faculty will verify the material in this section of the MFT is covered in our courses and determine if

	Not met	shy of the 53 benchmark). However, the benchmark of 60% of the students scored a 46 or higher was Met as exactly 60% of the student scored a 41 or higher. (n=10)		the benchmark needs adjusted. The Benchmark may need to be changed, because when we look at the Senior Cohort as a whole, only 36% scored a 51 or higher and the average was a 48 (n=14). Data from previous years will also be reviewed in this decision.
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	One benchmark for Section II of the MFT was Not Met and one benchmark was Met. The Average Score for the group was 52 (just shy of the 53 benchmark). However, the benchmark of 60% of the students scored a 46 or higher was Met as exactly 60% of the student scored a 41 or higher. (n=1		
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?	One benchmark for Section III of the MFT was Not Met and one benchmark was Met. The Average Score for the group was 52 (just shy of the 53 benchmark). However, the benchmark of 60% of the students scored a 46 or higher was Met as 70% of the student scored a 48 or higher. (n=10)		

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

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.

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	The Benchmark was Met as 75% of our PreMed Majors scored greater than a 3/5 on their interview	Mock_Interview_Scores.xlsx	
Direct - Class Assignment	Has the criterion 100% of students produce a professional CV or Resume been met yet? Met	The Benchmark was Met as 100% of our PreMed Majors generated a Professional CV and/or Resume (n=4)		

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? Not met	A lot of shadowing was not allowed last summer (which had the 55%) because of COVID restrictions. We expect to see these numbers return to above our 60% Benchmark in the following year.		- : A lot of shadowing was not allowed last summer (which had the 55%) because of COVID restrictions. We expect to see these numbers return to above our 60% Benchmark in the following year.

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

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.

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? Not met	The Benchmark was NOT Met as only 71% of our PreVet Majors scored higher than a 3/5 on their mock interview. (n=7)	Mock_Interview_Scores.xlsx	
Direct - Class Assignment	Has the criterion 100% of students produce a professional CV. been met yet? Met	The Benchmark was Met as only 100% of our PreVet Majors generated a Professional CV and/or Reseume (n=7)		

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? Not met	The Benchmark was NOT Met as 59% was the highest percentage for any given shadowing timeframe. (n=11)		- : Even though shadowing opportunities were a bit limited last summer because of COVID restrictions 59% of PreVet students still managed to have a shadowing experience - just shy of our 60% Benchmark. We expect to see these numbers return to well above our 60% Benchmark in the following year as for this upcoming summer, 56% have already secured a shadowing position and the other 44% have said they applied and/or are in the process of obtaining some sort of shadowing experience.

Analysis of the Assessment Process

Describe your assessment process; clearly articulate how the program uses coursework and or Student Performance Review for program wide assessment. Note any changes that occurred to the process since the previous year. Discuss what activities were successful 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.

Our BS Biology degree has two concentrations, a PreMed concentration and a PreVet Concentration. The two concentrations are a subset of courses designed to make these students more competitive when applying to the graduate and professional programs. For the PreMed Concentration, the courses in the concentration are designed to help with entrance exams (MCAT, PCAT, DAT) that are required for admission to human health graduate and professional programs such as Medical or Osteopathy Schools, Occupational Therapy, Physical Therapy, Pharmacy, Dental, etc.). The Biology Department has based the Assessment of our program around three main areas: (1) our core Biology courses; (2) direct Data Analysis related to two Objectives; and (3) the Biology Major Field Test. Our core Biology courses include General Biology I & II (BIO114 & BIO124), Genetics (BIO231), and Evolution (BIO401). For the benchmarks for all of our core Biology course, two of the four core courses Met the benchmark (BIO114 and BIO401) while two of the four core courses did not meet the benchmark (BIO124 and BIO231) of 70% of the students scoring a 70% or better on the assessment questions. In BIO124, only 67% of the students in the course scored at or above the benchmark, which is just shy of the 70% benchmark. However in BIO231, the student fell well below the expected benchmark as only 47% of the students in the course scored at or above the benchmark. The questions for the assessment quiz in BIO231 were more short answer type answers than other quizzes, so maybe that was a problem. There were several areas where our BS senior students did not meet the criterion for some of the benchmarks for the Biology Major Field Test (MFT), some were just shy and others were far from meeting the criteria for that objective. Summaries and improvement narratives are included under each assessment field within this report where we feel action is required.

The Major Field Test (MFT) was given to our graduating seniors during Student Performance Days in March. The only section of the Major Field Test in which both benchmarks were “Met” was Section IV, as the average score for the group was exactly 53 (the benchmark) and 70% of the students scored a 54 or higher (benchmark was 60% scoring a 51 or above).

For sections II and III of the MFT, one benchmark was not met and one was met. The average score for both sections was “Not Met” as the average score for both sections was a 52, just short of their benchmark which was an average of 53. However, the second part of the benchmarks for Section II and III were Met. The benchmark of 60% scoring a 51 or higher on Section II was Met as exactly 60% scored that amount or higher, and the 60% scoring a 46 or higher on Section III was Met as 70% scored that amount or higher.

For Section I, both of the benchmarks for the criterion were “not Met” as the average score was a 49 (benchmark was 53) and only 40% of the BS students score a 51 or above (benchmark was 60%). of the students scoring a 51 or higher on the section was also not met. This is the second consecutive year that both of the criterions were Not Met on Section I of the MFT. In 2021, average score this year score was 51 for the students (benchmark 53) and only 59% (benchmark 60%) of the students scored a 51 or higher (n=17). The Biology Faculty will take a two-fold approach as our plan of action. We will (1) specifically look at the content in Section and determine if the benchmarks for this may need adjusted and (2) 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) often with a single outlier.

The benchmark of 50% of students scoring at the 50th percentile rank or higher (Objective 4) was “Met” as only 60% of our students (n=10) reached that benchmark this year This is a combined score of all sections and the student’s overall performance on the exam, so we are quite please our students did meet this criterion. In looking at past years, there does not seem to me much consistency in our students scoring well enough in all sections to “Met” as it fluctuates each year between Met and Not Met. Therefore, we will definitely have discussions regarding the MFT content, as we now have a few years of MFT since ET made changes to Biology MFT so we can now determine if the sections still align with our program objectives and our curriculum. We will take a hard look at the MFT to determine if we need to change any benchmarks for any of the Objectives for the 2022 – 2023 academic year. While we may or may not make changes to our benchmark, the Biology Faculty will continue to use the MFT to assess student knowledge and the effectiveness of the program.

Even with 14 Seniors taking the MFT (10 BS and 4 BA), that number still is a relatively small cohort size in statistical terms. The problem of a small cohort for statistical significance will always exist at a university the size of William Woods, and strongly supports the usefulness of determining “knowledge added” assessment by determining “value added” to their score on the MFT. This was the first year that all of our graduating seniors should have taken the MFT as a freshman (Fall 2018 or Fall 2019) and as a senior (Spring 2022); however, we still only had 9 out 14 (7 BS and 2 BA) in which we had two MFT scores. Therefore, while this should have been a=our first complete cohort to truly look at the “knowledge added” by the curriculum in our program, we had three students transfer into the program and two senior somehow did not take it as a freshman. Even though we only had seven 2022 Biology BS graduating seniors with two data sets, we are still excited that the 2021 seniors (n=20) had an average percentile rank change of 40 percentile ranks and the average percent gain from their freshman score was 542%. Our graduating BS seniors (n=7) showed an average improvement in percentile rank of 40 and 86% of them had a percent gain of 103% or higher. This means the majority of our students more than doubled their percentile ranking. All of our graduating seniors 100% showed at least some knowledge gained. The student with the biggest change in percentile rank went from a percentile rank of 3 as a freshman, to a percentile rank of 63 as a senior, that is a percent gain of 2000%. The same student had percent gains in the four sections of the MFT ranging from 14.3% to 133.3%. The Biology Faculty feel this truly indicates the strength of our Biology Degree curriculum and our courses are actually adding to the scientific knowledge-base of our all our Biology majors. Using the data comparison data from 2019-2020, 2020-2021, and now 2021-2022, the Biology faculty now feel we have sufficient data to assess “knowledge gained” or “value added” for our program and will making a benchmark for the this for the 2022-2023 academic year.

Over the past several years, the Biology faculty have changed our interviews and direct Objective questions for the second- and third-year Biology Majors (“tweeners”) level students to a Data Analysis assessment activity. This is the third year using a data analysis assessment tool, and the Biology Faculty redesigned this portion of the University’s Student Performance Review Days (SPR Days), again. We wanted this portion to be more of a data analysis component. During the SPR Days, our tweener students were given two hours to read two short peer-reviewed article and then answer the subset of specific questions regarding the figures and the data for those two articles. While we feel this was definitely a worthwhile activity, we do feel there are still some modifications required to use this as a learning tool for data analysis. In addition, we may remove this from Objective 1 and Objective 3 and place it under Objective 5 to broaden the subject matter of the articles we use for this in the future. This year each faculty wrote seven questions for the article they chose and so the questions varied in type of question and rigor. Next year we plan to stay with only two article two articles, and more consistency of question type for each article to ensure the questions are more similar. This change/refinement of our assessment tools will provide help ensure our students are assessed on a more individual level of ability to analyze data and assessed equally by each faculty. This change will come at the expense of Direct Written Questions portion of

assessment for Objective 1 and Objective 3. As those two objectives are already assessed twice, and we are extremely satisfied with this change.

This is the fifth year we have had our incoming Biology Majors take the MFT; however, this is the four 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 (as stated above). 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.

All three of the Biology faculty have noticed the students in our classes often struggle with data analysis, so we devised a means to assess their data analysis abilities, because being able to analyze data is a required skill in a Biology/Science career. While there are definitely some changes to the assessment needed, overall we were very pleased and will be including this as part of our Student Performance Review Days, and probably incorporate it as part of assessment of Biology BS Objective 5.

This is the second year we gave a short self-reporting survey their Shadowing experiences as part of the assessment for Objective 5A and 5B to everyone except our graduating students (first – third years). This year we asked our BS students for any shadowing/volunteering/research/work experience outside of curriculum for the previous summer (Summer 2021), the Academic Year/Winter Break (2021), and any plans they are working on for Summer (2022). The Biology Faculty liked this change and plan to keep the survey of shadowing to all of our non-graduating Biology majors. For our Biology BS PreMed majors, 55% of them report shadowing in at least one of the three timeframes, while 59% of our Biology BS PreVet majors reported a shadowing experience in at least one of the three timeframes. The Biology Faculty are actually quite pleased with these percentages, considering summer is the most common times for students to obtain these shadow hours, and many of our students reported they still were not able due to COVID-19 regulations.

Biology Objective 5 is also assessed by the generation of a professional CV/Resume for 100% of our Juniors in BIO450 and during our Mock interviews, 75% or greater of the students will have provided interview responses that are satisfactory 3/5 or better. All of the PreMed and PreVet students produced a professional quality CV/Resume meaning the 100% benchmark was "Met." For our PreMed students, exactly 75% of them scored an average score of 3/5 or better which "Met" the benchmark; however, only 71% of our PreVet students had a satisfactory interview. As this is the first time in a couple years we were able to have the Mock interviews in person, we are not concerned with this problem.

In terms of class assessment, the faculty have been making a concerted effort to have a specific quiz or wrote specific exam questions that more specifically addressed assessing the objective. As a whole, writing specific objective-based questions made it more of a true assessment of the Objective. However, Only BIO114 and BIO401 "Met" their benchmark, with 92.9% and 100%, respectively, scoring 70% or better on the assessment for those two courses. Unfortunately, BIO124 and BIO23 benchmarks were "Not Met" as only 47% and 67% of the students in those two courses scored a 70% or better on the assessment quizzes used, respectively. While BIO124 was just shy of the 70% of students scoring a 70% or better on the assessment, the students in BIO231 fell incredibly short of the benchmark. We are hoping this may be post COVID-19 fallout and that our numbers will approve in the upcoming years.

With lightened COVID restrictions, we were able to bring back "Impartation of Wisdom" lunch event for just our new/incoming students and our outgoing graduating seniors. The Biology Faculty gave the "new" students a set of questions as conversation starters and we definitely feel this helped make it a very successful event as the faculty could hear the buzz of conversation from down the hallway. While this event is not necessary for any assessment, this is definitely important in the retention of our students and will definitely have this event each year.

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 were based around whether we should 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 2022 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.

The Biology Faculty 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 since the core course requirements between the degree programs only differ in that BA majors are required to take two semesters of Physics (with lab). In addition, we teach our Biology Students as a whole, to be able to understand all the various aspects of Biology. We do not teach them as just a BA major, or just a BS PreMed major, or just a BS PreVet major – we teach them as a **Biology Major**. Therefore, it would be so nice not to keep separating these reports and begin truly assessing the "Biology Program" – especially since you can only get a Biology BA or a Biology BS degree and the University only recognizes the "Biology" program as a whole in terms of programs and award ceremonies. Combining our Assessment into one, single report would have eliminated at least some of the "not met" benchmarks that were solely due to the extremely low sample sizes assessed when we split Biology into BA and BS, and then further split the BS into PreMed and PreVet students.

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	Met
Improvement Narrative	

Improvement Type	Summary
Refine Assessment Tool	We did not give our majors 2 weeks to read the articles. We chose two short articles and gave the students a minimum of 2 hours to read the articles and answer 7 specific questions about the figures and the data. We plan to move this Assessment to Objective 5 to give more latitude in choosing articles.

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	Biology Faculty will verify the material in this section of the MFT is covered in our courses and determine if the benchmark needs adjusted. The Benchmark

	may need to be changed, because when we look at the Senior Cohort as a whole, only 36% scored a 51 or higher and the average was a 48 (n=14). Data from previous years will also be reviewed in this decision.

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	Met
Improvement Narrative	

Improvement Type	Summary
	We did not give our majors 2 weeks to read the articles. We chose two short articles and gave the students a minimum of 2 hours to read the articles and answer 7 specific questions about the figures and the data. We plan to move this Assessment to Objective 5 to give more latitude in choosing articles.

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	Biology Faculty will verify the material in this section of the MFT is covered in our courses and determine if the benchmark needs adjusted. The Benchmark may need to be changed, because when we look at the Senior Cohort as a whole, only 36% scored a 51 or higher and the average was a 48 (n=14). Data from previous years will also be reviewed in this decision.

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	Not met
Improvement Narrative	

Improvement Type	Summary
	A lot of shadowing was not allowed last summer (which had the 55%) because of COVID restrictions. We expect to see these numbers return to above our 60% Benchmark in the following year.

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	Not met
Improvement Narrative	

Improvement Type	Summary
	Even though shadowing opportunities were a bit limited last summer because of COVID restrictions 59% of PreVet students still managed to have a shadowing experience - just shy of our 60% Benchmark. We expect to see these numbers return to well above our 60% Benchmark in the following year as for this upcoming summer, 56% have already secured a shadowing position and the other 44% have said they applied and/or are in the process of obtaining some sort of shadowing experience.

Program Activities

Student Performance Review

Describe the department Student Performance Review activities if not already articulated. Please describe the nature of the assessments conducted as well as the process of assessment happening 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?

Student Performance Review (SPR) days were back to two consecutive days as they have been in the past. Our Student Performance Schedule include the following events: (1) Biology MFT for our Graduating Seniors, (2) Figure Analysis of Research Articles for our second- and third-year Biology Majors (“tweeners”), (3) a survey of students self-reporting their Shadowing experiences (Summer 2020, Winter Break, plan for Summer 2021) for everyone except our graduating students (first – third years), (4) a Research Talk followed by a Meet & Greet Session, and (5) an “Impartation of Wisdom” luncheon with our new/incoming majors and our graduating seniors.

We always use the SPR Days to have our senior students take the Major Field Test (MFT) in Biology. Fourteen Biology Seniors (4 BA and 10 BS Majors) took the MFT this past February. The Biology Faculty are considering changing some of our benchmark from the “average score” to the median score” to help eliminate some of the issues when a single student in the cohort 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.

Of our 14 Biology graduating senior students who took the MFT this February, only 9 also took the MFT their first year in the program (7/10 BS students and 2/4 BA students). For those nine students, we were able to determine “knowledge gained” while attending WWU. This is the second academic year of a large amoount of entering MFT data and exiting MFT data of our seniors, therefore our current Benchmark is only 100% of the students will show a gain in knowledge between the two exams - and we achieved that benchmark. After three to four years of data, the biology faculty will determine what Benchmarks we want to use for this “knowledge-gained” 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. Since the data generated in BIO115 is being used simply as an entry-level baseline there is no specific benchmark for the scores on this exam, “Met” simply implies all students declared as majors at that time took the MFT.

The second- and third-year Biology Majors (“tweeners”) students are required to complete a Data Analysis Assessment activity. This is the third year using a Data Analysis Assessment activity, and the Biology Faculty **again** redesigned this portion of the University’s Student Performance Review. This year we provided our students with two short, peer-reviewed journal articles. These students were given two hours and asked to read those two journal articles and answer the subset of specific questions regarding the figures and the data for each article. This year each faculty wrote questions for the article they chose, and the types of questions varied greatly between the faculty. Next year we plan to write a single question (possibly with multiple parts or prompts) for each article to ensure the types of questions are more similar. This change will provide us the ability to truly assess each student’s ability to read, comprehend, and analyze data and to be able to assess each student on a more equal level. This assessment activity is currently under Objective 1 and Objective 3; however, we feel it is better to move the assessment to Objective 5 in order to widen the content area of the journal articles we can use for this assessment. We know we need to refine our assessment tools to help ensure our students are assessed on a more individual level and equally by each faculty.

This is the second year we decided to have everyone except our graduating students (first – third years) complete a short survey self-reporting their Shadowing experiences for the previous summer (Summer 2021), the Academic Year/Winter Break, and plans they are working on for Summer (2022). For our Biology BS PreMed majors, only 55% of them report shadowing in a single timeframe, while 59% of our Biology BS PreVet majors reported a shadowing experience in at least one of the three timeframes. A lot of shadowing was not allowed last summer (which had the because of COVID restrictions. We expect to see these numbers return to above our 60% Benchmark in the following year. The Biology Faculty liked this change of including the freshman/new majors in this survey and plan to keep the survey of shadowing to all of our non-graduating Biology majors.

Every year during Student Performance Days we bring a speaker who gives research-based talk to the entire department and all of our Biology Majors. Fortunately, we were able to hold the research talk in person in the Library Auditorium on campus. The Speaker was Preston Wolfe, a 2017 WWU Biology BS PreMed alum working on his Ph.D. at the University of Missouri, who gave a talk titled: “Evaluation of Serum and Urine Biomarkers for Developmental Dysplasia of the Hip.” The faculty were both excited and nervous to have an alum come back and talk; however, and it was clear to all that Preston has truly found his niche and is going to make significant contributions to his field. He actually related well to all three of the Biology degree majors. We also were able to hold an in-person Meet & Greet/Question & Answer reception after the seminar for students to interact with the speaker. 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. Therefore, this event is definitely something we will continue to incorporate that into our Student Performance Day schedule.

With lightened COVID restrictions, we were able to bring back “Impartation of Wisdom” lunch event for just our new/incoming students and our outgoing graduating seniors. The Biology Faculty gave the “new” students a set of questions as a conversation starter and we definitely feel this helped make it a very successful event as you could hear the buzz of conversation down the hall. While this event is not necessary for any assessment, this is definitely important in the retention of our students and will definitely have this event each year.

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.
Biology_Department_Schedule_for_SPR_Days___2022.pdf
Presenter_Flyer.pptx

Senior Showcase/Symposium
Describe program activities used to highlight Senior achievement. What benefit does the program gain from the activities? What if any assessment of students happens during this event?

Our entire cohort of 13 graduating Biology Seniors (3 BA seniors and 10 BS seniors) did their Senior Showcase as a poster session on Thursday, April 21 as part of an interdisciplinary Senior Showcase event with the Equestrian Department, Psychology Department, and the Social Work Department. Our students did not produce original work, but presented a Science-quality poster as a literature review for their chosen Biology topic of interest.

Tools used for Assessment
Upload rubrics or other Assessment based tools used by the program that are important to the assessment process.

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

Co-Curricular and LEAD Events
Describe Co-Curricular and LEAD events sponsored by program faculty. This includes LEAD and other events meant to engage students and foster learning outside of the classroom.

Robin Hirsch-Jacobson LEAD EVENTS

Tweets and Treats - Join Conservation Club in a discussion about Missouri's native birds! We will have pinecones, peanut butter, and bird seed to make DIY bird treats. This is an outside event so please bring a chair or blanket to sit on.

MDC Scavenger Hunt - Habitats of Missouri - Conservation Club has come up with a series of scavenger hunts for you to investigate. In order to begin, you will need to download the response sheet, head to the MDC website (Habitat section for this event) here: https://mdc.mo.gov/discover-nature/habitats. Event runs from October 4 through October 18.

MDC Scavenger Hunt - Conservation Club has come up with a series of scavenger hunts for you to investigate. In order to begin, you will need to download the response sheet, head to the MDC website (reptiles section for this event) here: https://mdc.mo.gov/field-guide/search?fgSpeciesType=1008 . Complete event November 1 to November 30.

Cowspiracy - Join Conservation Club as we watch a shortened version of Cowspiracy, the award winning documentary that highlights a hidden cause of global warming. Participants will engage in a discussion about how humans can adapt an unrecognized approach to sustainability. Limited to the first twenty students. Active participation in discussion is required for LEAD credit.

The Fun of Biology! - Come join the Biology Club for a super fun trivia night. It will be laid back, yet educational. Come and hopefully learn something new and have fun!

MDC Scavenger Hunt-Invasive and Nuisance Species of Missouri - Conservation Club has come up with a series of scavenger hunts for you to investigate. In order to begin, you will need to download the Reflection Form, head to the MDC website (Invasive and Nuisance Species) here: https://mdc.mo.gov/discover-nature/invasive-nuisance-species

Nature Boost: Black Bears - Join the Conservation Club in learning more about Missouri wildlife through an episode of the Nature Boost Podcast. Season 2, Episode 1 covers the black bear, including information on their history in Missouri and current state of hibernation. This event is available until February 28th. Here is a link to the podcast: https://mdc.mo.gov/contact-engage/nature-boost Please complete the attached reflection sheet for LEAD credit.

Ecology of Costa Rica - Twelve Biology majors went to Costa Rica over Spring Break and learned a ton about Tropical Ecology. Grab your lunch and head to the Ivy Room to see their fantastic pictures (monkeys, toucans, and more!), hear their stories, and learn a bit about the plants and animals in the tropics. This event will start at noon so please already have your lunch and your seat by noon so we can start promptly.

Kimberly L. Keller LEAD Events

Mythbusters: COVID Vaccine Edition - Join Dr. Kimberly Keller and Student Life to learn about the COVID vaccine, how vaccines really work, common myths and misconceptions, and more! We will discuss how you can help slow the spread of COVID-19 by getting the vaccine!! (Held twice – once in person and once virtual)

Choo Choo: Here Comes The Flu - Hop on the science train, and learn more about the Flu and Flu shots. Dr. Keller and Student Life will be discussing how you can help slow the roll of the Flu this season. After Dr. Keller's presentation, there will be a fun game of Kahoot! to test out your knowledge of the Flu and the shot! (Held twice – once in person and once virtual)

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 accomplishment a student achieved outside of course work or the normal expectation of student success.

Alexandra Gueck received the Distinguished Scholar Award for the Biology Program

Amy Daniel was selected to present at the Woods Talks **-** A Symposium for Scholarship and Creative Activity, the title of her talk was: "*The effects of megaherbivores on vegetation."*

Ashley Jeppesen volunteered to present at the Woods Talks **-** A Symposium for Scholarship and Creative Activity the title of her talk was: "*Equine Herpes Virus"*

Honors Program

Amy Daniel graduated with the designation of Honors after successfully completing her Honor Research titled: "***The Effect of Presentation Format on Perceived Comprehension as it Relates to Health Literacy***"

Kate George graduated with the designation of Honors after successfully completing her Honor Research thesis titled: ***"A Study of the Effects of the Implementation of Bedtime Routines in College-Aged Students"***

Riley Alton (Dec 2022 graduate) presented her Honor Research thesis titled***: "Item Recognition v. Order Memory Across Age Groups"***

Alumni Accomplishments
Please highlight special examples of any successes of recently graduated alumni (acceptance or graduation graduate school, employment or professional milestones).

Graduating Class of 2022

Victoria Papai – Accepted to the College of Veterinary Medicine at the University of Illinois (pursuing a DVM)

Alexandra Gueck – Accepted and planning to attend Stephens College Physician Assistant Program

Conrad Hansel – Accepted a GA position at William Woods University and will pursue a Master of Health Administration (MHA)

Previous Graduates:

Claire McDonald (2021) She is the 2022 recipient of the Elmer and Virginia Florman Scholarship from the College of Veterinary Medicine at the University of Missouri. This scholarship is given to a first-year student in good academic standing who graduated from a Missouri High School. The award is for four years, paying all costs associated with attendance to the College of Veterinary Medicine.

***Julia Lefarth (2021)** Was accepted into the College of Veterinary Medicine at the University of Missouri and will start in the fall.

*When Julia Lefarth starts Mizzou's Vet School this Fall, she will make seven WWU alumni attending Mizzou Vet School concurrently. The six students currently enrolled at Mizzou's CVM are: Allie Sturvant, Remi Johnson, Emily Tichy, Brody Leimkuehler, Caitlin (Cook) Franklin, and Claire McDonald

Nic Keithley (2018) Accepted a position with Lumeris (in Phoenix, Arizona), a healthcare consulting firm where they helping their partners move towards value-based healthcare (higher quality care at a lower cost)!

Preston Wolfe (2017) Received his PhD in Pathobiology from the University of Missouri Department of Orthopedic Surgery. Dissertation: "Evaluation of Serum and Urine Biomarkers for Developmental Dysplasia of the Hip".
Preston accepted an internship with Arthrex, Inc. (Naples, Florida), a global medical device company and medical education in orthopedics, where he will be working on orthobiologics products from research and development to approval for clinical use and marketing.

Joanie Ryan (2016) Received her Ph.D. in Microbiology from the Colorado State University (CSU) in May 2022. Dissertation: "The Enrichment and Separation of Mycobacterium tuberculosis Extracellular Vesicles with a side of Biosafety and Biosecurity."
She is now employed as an Assistant Biosafety Officer at CSU in their Research Integrity and Compliance Review and Biosafety Office.

Previous Graduates:

Claire McDonald (2021) She is the 2022 recipient of the Elmer and Virginia Florman Scholarship from the College of Veterinary Medicine at the University of Missouri. This scholarship is given to a first-year student in good academic standing who graduated from a Missouri High School. The award is for four years, paying all costs associated with attendance to the College of Veterinary Medicine.

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She is now employed as an Assistant Biosafety Officer at CSU in their Research Integrity and Compliance Review and Biosafety Office.

Faculty Accomplishments
Highlight special examples of faculty success in the profession/field/content area. This is for any accomplishment of a faculty member that is research or professional in nature.

Kimberly L. Keller – Co-author of a Manuscript Accepted for Publication in the Journal of Microbiology and Biology Education ***Student attitudes contribute to the effectiveness of a genomics CURE***. Acceptance date: March 2022, Publication Date – Fall edition

Appendix

	3.000 Exceeds	2.000 Meets	1.000 Fails 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 Student Demographics, Retention, and Degree Completion Data weight: 1.000	✓ The program provides a detailed description on the enrollment, retention, persistence and degree completion 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 enrollment, retention, persistence, and degree completion data provided.	The program does not reflect on enrollment, retention, persistence, and degree completion data in a detailed way.	N/A
Comment:				
Marketing Materials weight: 1.000	The program outlines the successes and needs in regards to marketing. Detailed suggestions on how to market the program and what niche areas that are program specific would benefit the marketing strategy.	The program discussed the general marketing strategy for the program.	✓ The program provided little to no discussion on the marketing materials or approach to how to market the program.	N/A
Comment:	The program has not had the opportunity to meet with marketing to discuss the plan or how the marketing is targeted.			
Alignment to University Objectives weight: 1.000	✓ The program provides a detailed explanation of how program courses align to the Institutional Objectives. This explanation details specific courses, or activities that coordinate with the intent of the Institutional Objectives.	The program provides a basic explanation of how program courses align to the Institutional Objectives. This explanation provides a minimal understanding of how the program is aligned to the Institutional Objectives.	The program provides little to no explanation of how program courses align to the Institutional Objectives.	N/A
Comment:	Program is still aligned to the old mission			
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:				
NSSE Objectives weight: 1.000	✓ The program provided a detailed listing of activities and assessments used within the program that focused on the identified NSSE objectives. The activities and assessments were divided out within the curriculum and impacted different cohort groups.	The program provided a basic explanation of the activities and assessments used within the program that focused on the identified NSSE objectives.	The program provided minimal explanation of the activities and assessments used within the program that focused on the identified NSSE objectives.	N/A
Comment:				
Curriculum Map alignment and changes weight: 1.000	The curriculum map is detailed and complete. All Changs made to the curriculum map are detailed with supporting rationale for the decision..	✓ The curriculum map is complete. Changes made to the curriculum map are explained with some explanation as to why the changes were implemented.	The curriculum map is not complete and little to no explanation on curricular changes was provided.	N/A
Comment:				
Assessment Map 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:				

Data Driven Decision-making is explained weight: 1.000	✓ An overview of program assessment is provided with details on the specific successes and challenges from the year. A detailed review of how assessment was administered over the academic year is clearly outlined.	A basic overview of program assessment is provided with some details on the successes and challenges from the year. A basic review of how assessment was administered over the academic year is outlined.	A basic overview of program assessment is not provided with little to no discussion on the administration of assessment over the academic year.	N/A
Comment:				
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:				
Analysis of Assessment 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 and LEAD 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:				

Appendix Data:

				SUBSCORES			
STUDENT NAME	Senior Major	TOTAL SCORE	Percentile	1 = Cell Biology	2 = Molecular Biology & Genetics	3 = Organismal Biology	4 = Population Biology, Evolution and Ecology
1	BS PreMed	154	55	48	50	60	54
2	Biology BA	134	9	35	41	35	36
3	BS PreMed	165	83	65	58	63	65
4	BS PreVet	158	67	57	53	54	65
5	BS PreMed	157	63	48	55	56	61
6	BS PreMed	153	52	51	58	48	54
7	BS PreMed	162	76	54	63	60	63
8	BS PreVet	142	22	42	38	54	36
9	BS PreVet	147	35	35	55	42	54
10	Biology BA	165	83	65	65	62	61
11	Biology BA	139	16	45	34	39	43
12	BS PreVet	145	29	48	44	44	48
13	BS PreVet	137	12	42	44	37	33
14	Biology BA	145	29	35	41	50	50
	AVERAGE	150	45	48	50	50	52

Biology BS PreMed Students

STUDENT NAME	Senior Major	TOTAL SCORE	Percentile	1 = Cell Biology	2 = Molecular Biology & Genetics	3 = Organismal Biology	4 = Population Biology, Evolution and Ecology
1	BS PreMed	154	55	48	50	60	54
2	BS PreMed	158	67	57	53	54	65
3	BS PreMed	153	52	51	58	48	54
4	BS PreMed	162	76	54	63	60	63
5	BS PreMed	142	22	42	38	54	36
		154	54	50	52	55	54

Biology BS PreVet Students

STUDENT NAME	Senior Major	TOTAL SCORE	Percentile	1 = Cell Biology	2 = Molecular Biology & Genetics	3 = Organismal Biology	4 = Population Biology, Evolution and Ecology
1	BS PreVet	165	83	65	58	63	65
2	BS PreVet	157	63	48	55	56	61
3	BS PreVet	147	35	35	55	42	54
4	BS PreVet	145	29	48	44	44	48
5	BS PreVet	137	12	42	44	37	33
		150	44	48	51	48	52

Biology BA Students

STUDENT NAME	Senior Major	TOTAL SCORE	Percentile	1 = Cell Biology	2 = Molecular Biology & Genetics	3 = Organismal Biology	4 = Population Biology, Evolution and Ecology
1	Biology BA	134	9	35	41	35	36
2	Biology BA	165	83	65	65	62	61
3	Biology BA	139	16	45	34	39	43
4	Biology BA	145	29	35	41	50	50
		146	34	45	45	47	48

1/4 = 25%

ALL Biology BS Students

STUDENT NAME	Senior Major	TOTAL SCORE	Percentile	1 = Cell Biology	2 = Molecular Biology & Genetics	3 = Organismal Biology	4 = Population Biology, Evolution and Ecology
1	BS PreMed	154	55	48	50	60	54
2	BS PreMed	158	67	57	53	54	65
3	BS PreMed	153	52	51	58	48	54
4	BS PreMed	162	76	54	63	60	63
5	BS PreMed	142	22	42	38	54	36
6	BS PreVet	165	83	65	58	63	65
7	BS PreVet	157	63	48	55	56	61
8	BS PreVet	147	35	35	55	42	54
9	BS PreVet	145	29	48	44	44	48
10	BS PreVet	137	12	42	44	37	33
		152	49	49	52	52	53

6/10 = 60%

Subscore 1: Cell Biology			2: Molecular Biology and Genetics			3: Organismal Biology			4: Population Biology, Evolution, and Ecology		
Raw score Section 1 2022	Raw score Section 1 previous	% change	Raw score Section 2 2022	Raw score Section 2 previous	% change	Raw score Section 3 2022	Raw score Section 3 previous	% change	Raw score Section 4 2022	Raw score Section 4 previous	% change
48	42	14.3	50	27	85.2	60	46	30.4	54	38	42.1
65	45	44.4	58	44	31.8	63	42	50.0	65	45	44.4
57	42	35.7	53	27	96.3	54	39	38.5	65	36	80.6
48	42	14.3	55	38	44.7	56	24	133.3	61	31	96.8
54	38	42.1	63	50	26.0	60	52	15.4	63	50	26.0
42	42	0.0	38	23	65.2	54	46	17.4	36	52	-30.8
65	45	44.4	65	47	38.3	62	56	10.7	61	52	17.3
45	38	18.4	34	41	-17.1	39	39	0.0	43	38	13.2
42	42	0.0	44	34	29.4	37	32	15.6	33	31	6.5
52	**42**	**24**	**51**	**37**	**44**	**54**	**42**	**35**	**53**	**41**	**33**

2022 Senior Cohort - PreVet

		Percentile Scores				1: Cell Biology			2: Molecular Biology and Genetics			3: Organismal Biology			4: Population Biology, Evolution, and Ecology		
Student Names	Total score (Range is 120-200)	Overall 2022 (percentile)	Overall previous (percentile)	Change in Percentile	% change	Raw score Section 1 2022	Raw score Section 1 previous	% change	Raw score Section 2 2022	Raw score Section 2 previous	% change	Raw score Section 3 2022	Raw score Section 3 previous	% change	Raw score Section 4 2022	Raw score Section 4 previous	% change
1	154	55	12	43	358	48	42	14.3	50	27	85.2	60	46	30.4	54	38	42.1
2	165	83	21	62	295	65	45	44.4	58	44	31.8	63	42	50.0	65	45	44.4
3	157	63	3	60	2000	48	42	14.3	55	38	44.7	56	24	133.3	61	31	96.8
4	162	76	33	43	130	54	38	42.1	63	50	26.0	60	52	15.4	63	50	26.0
5	158	67	7	60	857	57	42	35.7	53	27	96.3	54	39	38.5	65	36	80.6
6	142	22	19	3	16	42	42	0.0	38	23	65.2	54	46	17.4	36	52	-30.8
7	137	12	5	7	140	42	42	0.0	44	34	29.4	37	32	15.6	33	31	6.5
AVERAGES	**154**	**54**	**14**	**40**	**542**	**51**	**42**	**22**	**52**	**35**	**54**	**55**	**40**	**43**	**54**	**40**	**38**

BS Biology - PreVet
BS Biology - PreMed
BA Biology

2022 Senior Cohort - PreVet		Percentile Scores				Subscore 1: Cell Biology			2: Molecular Biology and Genetics			3: Organismal Biology			4: Population Biology, Evolution, and Ecology		
Student Names	Total score (Range is 120-200)	Overall 2022 (percentile)	Overall previous (percentile)	Change in Percentile	% change	Raw score Section 1 2022	Raw score Section 1 previous	% change	Raw score Section 2 2022	Raw score Section 2 previous	% change	Raw score Section 3 2022	Raw score Section 3 previous	% change	Raw score Section 4 2022	Raw score Section 4 previous	% change
1	158	67	7	60	857	57	42	35.7	53	27	96.3	54	39	38.5	65	36	80.6
2	142	22	19	3	16	42	42	0.0	38	23	65.2	54	46	17.4	36	52	-30.8
3	137	12	5	7	140	42	42	0.0	44	34	29.4	37	32	15.6	33	31	6.5
AVERAGES	**146**	**34**	**10**	**23**	**338**	**47**	**42**	**12**	**45**	**28**	**64**	**48**	**39**	**24**	**45**	**40**	**19**

BS Biology - PreVet
BS Biology - PreMed
BA Biology

2022 Senior Cohort - ALL		Percentile Scores				Subscore 1: Cell Biology			2: Molecular Biology and Genetics			3: Organismal Biology			4: Population Biology, Evolution, and Ecology		
Student Names	Total score (Range is 120-200)	Overall 2022 (percentile)	Overall previous (percentile)	Change in Percentile	% change	Raw score Section 1 2022	Raw score Section 1 previous	% change	Raw score Section 2 2022	Raw score Section 2 previous	% change	Raw score Section 3 2022	Raw score Section 3 previous	% change	Raw score Section 4 2022	Raw score Section 4 previous	% change
1	154	55	12	43	358	48	42	14.3	50	27	85.2	60	46	30.4	54	38	42.1
2	165	83	21	62	295	65	45	44.4	58	44	31.8	63	42	50.0	65	45	44.4
3	157	63	3	60	2000	48	42	14.3	55	38	44.7	56	24	133.3	61	31	96.8
4	162	76	33	43	130	54	38	42.1	63	50	26.0	60	52	15.4	63	50	26.0
AVERAGES	**160**	**69**	**17**	**52**	**696**	**54**	**42**	**29**	**57**	**40**	**47**	**60**	**41**	**57**	**61**	**41**	**52**

BS Biology - PreVet
BS Biology - PreMed
BA Biology

2022 Senior Cohort - BA BIO		Percentile Scores				Subscore 1: Cell Biology			2: Molecular Biology and Genetics			3: Organismal Biology			4: Population Biology, Evolution, and Ecology		
Student Names	Total score (Range is 120-200)	Overall 2022 (percentile)	Overall previous (percentile)	Change in Percentile	% change	Raw score Section 1 2022	Raw score Section 1 previous	% change	Raw score Section 2 2022	Raw score Section 2 previous	% change	Raw score Section 3 2022	Raw score Section 3 previous	% change	Raw score Section 4 2022	Raw score Section 4 previous	% change
1	165	83	41	42	102	65	45	44.4	65	47	38.3	62	56	10.7	61	52	17.3
2	139	16	12	4	33	45	38	18.4	34	41	-17.1	39	39	0.0	43	38	13.2
AVERAGES	**152**	**50**	**27**	**23**	**68**	**55**	**42**	**31**	**50**	**44**	**11**	**51**	**48**	**5**	**52**	**45**	**15**

BS Biology - PreVet
BS Biology - PreMed
BA Biology

Averages		Percentile Scores				Subscore 1: Cell Biology			2: Molecular Biology and Genetics			3: Organismal Biology			4: Population Biology, Evolution, and Ecology		
Degree Program	Total score (Range is 120-200)	Overall 2022 (percentile)	Overall previous (percentile)	Change in Percentile	% change	Raw score Section 1 2022	Raw score Section 1 previous	% change	Raw score Section 2 2022	Raw score Section 2 previous	% change	Raw score Section 3 2022	Raw score Section 3 previous	% change	Raw score Section 4 2022	Raw score Section 4 previous	% change
BS PreVet	146	34	10	23	338	47	42	12	45	28	64	48	39	24	45	40	19
BS PreMed	160	69	17	52	696	54	42	29	57	40	47	60	41	57	61	41	52
BA	152	50	27	23	68	55	42	31	50	44	11	51	48	5	52	45	15

BIO124 – General Biology II: Assessment Quiz Scores

Student	Score (%)
A	100
B	60
C	80
D	100
E	100
F	60
G	80
H	80
I	80
J	60
K	100
L	100
M	80
N	80
O	60
P	60
Q	100
R	100
S	60
T	40
U	100

BIO401 – Evolution: Assessment Quiz Scores

Student	Score (%)
A	100
B	100
C	85
D	100
E	85
F	90
G	95
H	85
I	100
J	70
K	80
L	85

All Student Performance Review Activities for the Biology Department will be held on Tuesday, February 22 and Wednesday, February 23!!!

Remember the Biology Department Student Performance Review Activities are required as part of your degree.
Please refer to the schedule on the next page.
If you have a problem attending or completing any of the requirements, please email or talk to one of the three Biology Faculty as soon as possible.

Group Explanations:

Graduating Seniors = Those Biology Majors that are graduating in 2022 (April or December) and currently enrolled in BIO401 [evolution]
2nd and 3rd year Students = Those Biology Majors who have completed BIO231/ 2332 [Genetics] but are **NOT enrolled in BIO401**
1st year Students = Those Biology Majors who are currently enrolled in BIO124/125 [Gen Biology II] but NOT completed BIO231/ 2332 [Genetics]
Seniors (by status/credit hours) = Those Biology Majors who have completed over 90 credit hours may have been selected by University Assessment to reach the required numbers for the CLA

Information and Questions:

- **Graduating Seniors** – Dr. Hirsch-Jacobson will provide details of MFT in BIO401
- **1st years** – Dr. Hirsch-Jacobson will provide details in BIO124 about Student Performance Review Activities
- **2nd and 3rd years** – Expect an email from Dr. Greenland-White regarding sign-up and details of the Journal Article Reviews = Data Interpretation
- **Seniors** (**by status/credit hours**) – Expect an email from Dr. Keller about taking the CLA
- **All Biology Majors** - Expect an email from Dr. Keller with links regarding the surveys - those should take ~5 – 10 minutes, so please try and have them completed in the time slot allotted.

Tuesday – February 22, 2022			
Time	**Group**	**Assessment**	**Faculty in Charge**
10:00am – 12:00pm	**Graduating Seniors** - **Required**	**Biology Major Field Test** Cox200 – Computer lab	Dr. Robin Hirsch-Jacobson
12:00 – 12:30pm	**Graduating Seniors** - **Required**	**On-line Survey** about Shadowing/ Internships and Life plans	Dr. Kimberly Keller
10:00am – 5:00pm	**2nd and 3rd Biology Majors** - **Required**	**Journal Article Review/Data Interpretation** Students will sign-up for a 2-3 hour block during the day – more details to come. Cox209 10:00am – 5:00pm and Cox200 (after 12:00pm)	Dr. Sarah Greenland-White
6:00 – 7:00pm	**ALL BIOLOGY MAJORS** **Required**	**Research Talk by: Preston Wolfe** **Doctoral Candidate University of Missouri** "Evaluation of Serum and Urine Biomarkers for Developmental Dysplasia of the Hip"	Dr. Kimberly Keller
7:00 – 8:00pm	**All Biology Majors are Welcome - Optional**	**Meet & Greet with Presenter** Ask more questions about his talk or his journey Cox300	Dr. Kimberly Keller
Wednesday – February 23, 2022			
10:00am – 12:00pm	**Seniors** (**by status/credit hours**) – **Required**	**University Assessment - CLA** Cox200 – Computer lab	Dr. Kimberly Keller
10:00am – 12:00pm	**1st, 2nd and 3rd years** - **Required**	**On-line Survey** about Shadowing/Internships	Dr. Kimberly Keller
12:00 – 1:30pm	**Graduating Seniors** and **First years** - **Required**	**Impartation of Wisdom Lunch** Cox300	Dr. Robin Hirsch-Jacobson Dr. Sarah Greenland-White

Degree Plan	Interviewer 1	Interviewer 2	AVG
BA	4.25	4.5	4.375
BA	2.75	3	2.875
BA	4	4	4
BA	4	4	4
AVG	3.750	3.875	3.813

75% received a 3/5 or higher

(n=4)

Degree Plan	Interviewer 1	Interviewer 2	AVG
Pre-Med	4	4.5	4.25
Pre-Med	4	4.375	4.188
Pre-Med	4.25	4.25	4.25
Pre-Med	3	2.62	2.81
AVG	3.813	3.936	3.874

75% received a 3/5 or higher

(n=4)

Degree Plan	Interviewer 1	Interviewer 2	AVG
Pre-Vet	2.5	2.25	2.375
Pre-Vet	4.5	4	4.25
Pre-Vet	3.5	3.5	3.5
Pre-Vet	4.5	4.75	4.625
Pre-Vet	3.875	4.5	4.188
Pre-Vet	1.625	2	1.813
Pre-Vet	4.25	4.25	4.25
AVG	3.536	3.607	3.571

71% received a 3/5 or higher

(n=7)

Degree Plan	Interviewer 1	Interviewer 2	AVG
BA	4.25	4.5	4.375
BA	2.75	3	2.875
BA	4	4	4
BA	4	4	4
AVG	3.750	3.875	3.813

75% received a 3/5 or higher

(n=4)

Degree Plan	Interviewer 1	Interviewer 2	AVG
Pre-Med	4	4.5	4.25
Pre-Med	4	4.375	4.188
Pre-Med	4.25	4.25	4.25
Pre-Med	3	2.62	2.81
AVG	3.813	3.936	3.874

75% received a 3/5 or higher

(n=4)

Degree Plan	Interviewer 1	Interviewer 2	AVG
Pre-Vet	2.5	2.25	2.375
Pre-Vet	4.5	4	4.25
Pre-Vet	3.5	3.5	3.5
Pre-Vet	4.5	4.75	4.625
Pre-Vet	3.875	4.5	4.188
Pre-Vet	1.625	2	1.813
Pre-Vet	4.25	4.25	4.25
AVG	3.536	3.607	3.571

71% received a 3/5 or higher

(n=7)

Student Performance Review Event

When: Tuesday, February 22

Where: Library Auditorium

Biology Department Research Talk:

Preston Wolfe

"Evaluation of Serum and Urine Biomarkers for Developmental Dysplasia of the Hip"

Doctoral Candidate University of Missouri

Department of Orthopaedic Surgery

School of Medicine
University of Missouri

WILLIAM WOODS
UNIVERSITY

Preston Wolfe graduated from William Woods University with a Bachelor of Science as a Biology Pre-Med Concentration Major in May of 2017 and was a student-athlete on the Track & Field Team. Preston has completed his doctoral coursework at the University of Missouri (Department of Orthopaedic Surgery) and will soon be defending his dissertation research and completing his Ph.D.

Igea, J., Tanentzap, A.J. Global topographic uplift has elevated speciation in mammals and birds over the last 3 million years. Nat Ecol Evol 5, 1530–1535 (2021). https://doi.org/10.1038/s41559-021-01545-6

Name	Reviewer 1	Reviewer 2	Reviewer 3	AVG of 3 Scores
Student 1	3.7	4.5	4	4.07
Student 2	4.6	3.5	3.5	3.87
Student 3	4.4	3.5	4	3.97
Student 4	4.5	5	4.5	4.67
Student 5	4.6	4.5	4.5	4.53
Student 6	3.4	4	3.5	3.63
Student 7	4.5	5	5	4.83
Student 8	4.4	5	5	4.80
Student 9	4.1	3.5	4	3.87
Student 10	3.9	3.5	3.5	3.63
Student 11	4.2	4	4	4.07
Student 12	3.5	3.5	3.5	3.50
Student 13	4.1	4	4	4.03
Student 14	4.6	5	5	4.87
Student 15	3.1	1.5	2	2.20
Student 16	3.1	3	3	3.03
Student 17	3.2	2	2.5	2.57
Student 18	3.9	4	4	3.97
Student 19	4.2	4.5	4.5	4.40
Student 20	3.4	2.5	3	2.97
Student 21	2.9	3	3	2.97
Student 22	3.9	4	4	3.97

80%

18/22 AVG a 3/5 or higher on the questions

Shen, S., Lim, G., You, Z. et al. Gut microbiota is critical for the induction of chemotherapy-induced pain. Nat Neurosci 20, 1213–1216 (2017). https://doi.org/10.1038/nn.4606

Name	Reviewer 1	Reviewer 2	Reviewer 3	AVG of 3 Scores
Student 1	3.5	3.4	3	3.30
Student 2	3.5	2.8	2.5	2.93
Student 3	4	4	4	4.00
Student 4	5	4.8	5	4.93
Student 5	4	4.7	4.5	4.40
Student 6	3	3.6	3.5	3.37
Student 7	4	3.8	3.5	3.77
Student 8	3	2.6	3	2.87
Student 9	3.5	3.8	3.5	3.60
Student 10	3.5	3.7	3.5	3.57
Student 11	4.5	4.4	4.5	4.47
Student 12	3	3.2	3	3.07
Student 13	3.5	4.1	3.5	3.70
Student 14	5	3.7	4	4.23
Student 15	3	3.2	3	3.07
Student 16	1	1.1	1	1.03
Student 17	2	2.7	2	2.23
Student 18	5	4.5	5	4.83
Student 19	5	5	5	5.00
Student 20	2	3.3	2.5	2.60
Student 21	4.5	4.4	4	4.30
Student 22	5	4.1	4	4.37

77%

17/22 scored an average of 3/5 or higher

Igea, J., Tanentzap, A.J. **Global topographic uplift has elevated speciation in mammals and birds over the last 3 million years.** *Nat Ecol Evol* **5,** 1530–1535 (2021). https://doi.org/10.1038/s41559-021-01545-6

Notes: The first 4 pages of the article are all you need to answer any of these questions, the remaining pages are methods, citations, supplemental figures.

Answer the following questions regarding the article. ***Please expand on your answers as you need to provide enough information so that we can assess your understanding of the paper and its figures.***

1. Using Figure 1, explain the framework for this paper.

How does current and historical temperature and elevation change effect speciation rates in mammals and birds.

2. What is figure 2 showing?

The effect and strength of effect that current and historical temperature and elevation change has on speciation rates in mammals and birds. We see that historical change in elevation is an important driver in mammals and historical elevation change and historical temperature are important in birds.

3. Using figure 3, how are uplifted areas and eroded areas different in regards to speciation rates of ***mammals***?

Historical elevation gain had a large effect on mammals whereas historically eroded areas had no effect at all.

4. What reason do the authors suggest as to why birds and mammals respond to abiotic changes differently?

Geographic isolation and cessation of gene flow is easier to achieve in mammals than birds cuz birds can fly whereas birds may be more sensitive to temp due to laying eggs (reproduction external)

5. What is the difference between figure 3 and figure 4?

By lumping eroded and uplifted areas together in Figure 4, we see that elevation change alone is not as important a variable, as to when it's analyzed separately.

6. Looking at figures 2, 3, and 4 what is the effect of current temperature on speciation and speculate as to why we see this effect?

Present temperature change is negatively associated with speciation therefore it leads to extinction. Having a warming and fragmented world is leading to extinction rates much higher than speciation rates.

7. What's the overall take-home result of the paper?

Historically topography is an important component of speciation, particularly uplifted areas. However current day is more driven by temperature changes.