Environmental Science

Environmental Science:

- Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

SI Section Templates: 1.A. Program or Unit Description, 1.B. Program or Unit Mission, 1.C. Program Learning Outcomes, 2.A. Progress on Previous Findings and Recommendations, 3.A. Technical Programs (AAS degrees and Certificates; Allied Health Programs only), 3.B. Transferability, 3.C. Student-centered Offerings, 3.D. Accessibility of Instructional Materials, 4.A. Curriculum Mapping, 4.B.1 Evidence of Program Learning Outcomes Assessment, 4.C. General Education Outcomes Assessment, 4.D. Five-year Course Assessment Cycle, 5.A. FTE, Section Count, Course Fill Rate, and Unsuccessful Enrollment Attempts, 5.B. Student Demographics: Ethnicity, Gender, Credit Load, Student Status, and Age Range, 6.A. Course Completion, 6.B. Graduation and Transfer, 7.A. Faculty Achievement, 7.B. FT/PT Faculty and Student Credit Hours Taught, 7.C. Support Staff, 7.D. Facilities and Technology, 8.A. Five Year Plan, 9.A. Resource Requests, Academic Standards and Assessment Committee Findings and Recommendations, Dean's Findings and Recommendations, Vice President of Academic Affairs' Findings and Recommendations

Date: 09-07-2022

Sorted by: Section

1.A. Program or Unit Description

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Briefly describe the program/unit, including but not limited to the following: academic division that the program/unit belongs to, the academic area(s) represented, degrees/certificates offered, average student enrollment, number of full-time faculty, type of curriculum or pedagogical approaches, and any other pertinent aspect of the program/unit.

The Environmental Science Program is a unit of the Math and Physical Sciences Division. This program offers an Associate of Science degree in Environmental Science, which is designed to prepare students for transfer to University of Nevada, Reno and to similar programs at other four-year institutions. Additionally, Environmental Science program supports TMCC degrees in the Physical Sciences department as well as college's General Education program. Instructors in the Environmental Science program teach both the lectures and labs using active learning pedagogical approach, and labs are designed to give

students real-world application of the theory discussed in the classroom. The program provides opportunities to learn practical skills by participation in undergraduate research. The Environmental Science program currently has one full time faculty and five part-time instructors.

1.B. Program or Unit Mission

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

State the department's or unit's mission. Describe how it aligns to the College's Mission, and how program learning outcomes (PLOs) for degrees and certificates offered, or for the unit, align to the department/unit mission. If your department or unit does not currently have a mission statement, please discuss among your colleagues and develop one.

The mission of the Environmental Science program is to provide students with basic principles of environmental science and give them life-long problem solving and analytical skills to establish strong foundation for a continued education in environmental sciences, or future careers in private consulting firms, industries, non-profit organizations, higher education, and government agencies. This mission reflects the TMCC mission to promote "student success, academic excellence and access to lifelong learning by supporting high-quality education and services within our diverse community" as well as the Core Themes of Student Success, Academic Excellence, and Access to Lifelong Learning.

1.C. Program Learning Outcomes

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Program Learning Outcomes (PSLOs or PLOs)
Environmental Science
Associate of Science, Environmental Science

Program Learning Outcomes (PSLOs or PLOs)
PSLO1: Perform both laboratory and field experiments using the scientific method, which requires observation, hypothesis testing, data collection, and the application of basic biological and chemical principles to explain results. (Active from Fall 2010)
PSLO2: Demonstrate effective oral and written communication, teamwork and collaboration in scientific, mathematical and other settings. (Active from Fall 2010)
PSLO3: Explain the impacts of different environmental pollutants and critically evaluate various pollution mitigation efforts in the context of regional and global policies, economics, and politics. (Active from Fall 2010)
PSLO4: Explain major impacts of human activities on environmental quality and identify and assess solutions to current and potential environmental problems, such as global climate change, biodiversity loss, and human population growth and use of natural resources. (Active from Fall 2010)
PSLO

2.A. Progress on Previous Findings and Recommendations

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Describe your progress on the major findings and recommendations for the program/unit from the last PUR, any annual progress reports (APRs), and if applicable, external reviews, (e.g. advisory boards, articulation committees, and program accreditors).

   • **Which findings and recommendations have the program/unit addressed?**
   • **Which have yet to be accomplished? Which are no longer relevant, and why?**
   • **Has the program/unit undergone any major changes as a result or that would impact the findings and recommendations since the last PUR?**

The following recommendations and strategies were identified in the most recent Program/Unit Review and/or APRs for Physical Sciences department which includes Environmental Science program and other programs such as Chemistry, Physics, Geology, and Engineering. These recommendations and strategies were for the Physical Sciences department as a whole and not specific to Environmental Science program. Since this PUR is Environmental Science program specific, only those recommendations and strategies that are applicable to Environmental Science program are addressed here.

Strategy #1: Successfully complete faculty tenure-track search and put in

place mentoring programs for new hires.
> Accomplished. Successfully filled one full-time Environmental Science faculty position.

Strategy #2: Develop specific faculty advisement strategies by discipline for students in 200-level physical science courses seeking an emphasis in a department discipline to increase transfer and graduation numbers.
Not applicable to Environmental Science program.

Strategy #3: Continue to monitor low transfer data and develop solutions to increase transfer rate. Implement strategies to increase graduation rates, including co-admission program with UNR and reverse transfers.
According to the latest Physical Sciences APR (2106-2017) Dean of Sciences is leading this effort.

Strategy #4: Within constrained resources, design and implement programs to recruit more women and minorities into the physical science disciplines.
Yet to be accomplished. Proportion of ENV students is fairly equal between genders (female: 48.6%; male: 51.4%). Proportion of NRES students between female and male is 57.1% and 42.9% respectively, which is fairly similar to college wide gender ratio (female: 54.3%; male: 45.7%). Percentages of some underrepresented groups are lower in both ENV and NRES courses. The program should increase effort to increase enrollment in ENV and NRES from some underrepresented groups.

Strategy #5: Set specific goals and monitor increase external funding for innovative STEM programs designed to meet the needs of students and employers within Nevada.
Ongoing. Environmental Science program obtained NSF Nevada EPSCOR grant to involve a student in undergraduate research. The research project produced an educational module that was used across multiple sections of ENV 101. The program involved students in undergraduate research sponsored by NASA. Additionally, the program received TMCC Foundation Faculty and Staff Innovation Grant to purchase laboratory equipment. Environmental Science program continues to pursue external funding opportunities.

Strategy #6: Review and revise Student Learning Outcomes and Measures as required by Office of Assessment.
> Complete. Student Learning Outcomes and Measures have been
revised for Environmental Science courses.

Strategy #7: Develop an annual process within each discipline to use data to develop and analyze strategies for improving student success in retention, transfer, and graduation.
Ongoing. Environmental Science courses include assessment which involves

pre-test/post-test measurement of learning gains. Data is used in reflecting on possible course revisions to enhance student learning.

Strategy #8: Within institutional space planning study, identify and implement solutions to lab and storage space inadequacies.
Not applicable to environmental science program because enough lab and storage space are available for the program currently.

Describe any major changes that the program/unit has undergone since the last PUR.
A.S. Environmental Science was first revised to include two tracks to align the degree with B.S. degree in Environmental Science at UNR. The A.S. degree was again revised to consolidate the two tracks into one when GEOG 121 was deactivated at TMCC. NRES 217 was added to the degree while NRES 211 was removed. The A.S. Environmental Science degree maintains parity with the B.S degree in Environmental Science at UNR.

3.A. Technical Programs (AAS degrees and Certificates; Allied Health Programs only)

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Describe how your program(s) are meeting labor market demands and industry curriculum needs by answering the accompanying questions. The following are potential resources for labor market data, though other sources may be referenced.
Nevada Department of Employment Training and Rehabilitation (DETR) (https://detr.nv.gov/)
Economic Development Authority of Western Nevada (EDAWN) (http://edawn.org/)
U.S. Bureau of Labor Statistics (http://www.bls.gov/)

  • **What is the evidence for the regional need for the program (DETR and EDAWN data)?**
  • **What is the evidence that program curriculum meets the latest industry trends or workforce needs?**

Not applicable.

3.B. Transferability

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

> **• Which Bachelor's degrees(s), especially within the Nevada System of Higher Education, does the program's AA or AS degree(s) align?**
> **• Does the AA or AS transfer seamlessly in a 2+2 agreement without a loss of credits or a substantial amount of courses counting only as general electives? Please reference the appropriate transfer agreement in the receiving institution's catalog and explain.**

Which Bachelor's degrees(s), especially within the Nevada System of Higher Education, does the program's AA or AS degree(s) align with?
The A.S., Environmental Science is a two-year transferable degree designed to provide students with necessary background needed for a seamless transfer to Bachelor's degree program in Environmental Science at University of Nevada, Reno.

Does the AA or AS transfer seamlessly in a 2+2 agreement without a loss of credits or a substantial amount of courses counting only as general electives? Please reference the appropriate transfer agreement in the receiving institution's catalog and explain.
Currently, TMCC has 2+2 agreement with UNR for a transfer of TMCC's A.S. degree to a UNR's B.S. degree in environmental science. Initiative will be taken towards creating a transfer agreement with UNR for A.S. Environmental Science degree.

3.C. Student-centered Offerings

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

> **• Is the program Information In the catalog up-to-date?**
> **• Does the program's suggested course sequence in the catalog allow for completion of degrees within 2 years and/or certificates within 2 semesters for full-time students? Is there a recommended sequence for part-time students?**

- **Describe how courses are scheduled and faculty teaching schedules are assigned. How does the department/unit schedule its course offerings in a student-centered manner that meets student demand and allows for efficient completion? How are teaching assignments determined so that they are equitable for faculty?**

Is the program Information in the catalog up-to-date?
Catalog information is reviewed regularly and is currently up to date.

Does the program's suggested course sequence in the catalog allow for completion of degrees within 2 years and/or certificates within 2 semesters for full-time students? Is there a recommended sequence for part-time students? Yes, it is possible for a student to complete a A.S. degree in Environmental Science in four semesters. This includes general education and other non-environmental science courses required for the degree.

Describe how courses are scheduled and faculty teaching schedules are assigned. How does the department/unit schedule its course offerings in a student-centered manner that meets student demand and allows for efficient completion? How are teaching assignments determined so that they are equitable for faculty?
Classes are scheduled by rolling over the last corresponding semester, i.e., Fall 2020 is rolled over to become the base for Fall 2021. Prior to the schedule becoming official, faculty is given an opportunity to review it in Excel, indicate which classes he prefers to teach, and is encouraged to provide feedback as to overall course offerings.

The roll-over process allows students to reliably predict the days, times, and locations in which courses are likely to be offered and plan accordingly to take courses for degree completion in timely manner. Multiple sections of high demand course (ENV 101 Introduction of Environmental Science) are offered at different days, times, and locations (e.g., Dandini and Meadowood campuses) to accommodate the needs of diverse group of students, including part-time and full-time students. The program allows opportunities for students to take courses in both online (e.g., ENV 101 Introduction to Environmental Science) and onsite formats as well as in sixteen-, eight-, or four-week periods. Online offerings and course sections are increased as enrollment warrants.

3.D. Accessibility of Instructional Materials

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

What is the department/unit currently doing or planning to help ensure that instructional materials are accessible to students with disabilities? For example, have all full-time faculty attended accessibility workshops? Have full-time faculty used the accessibility purchase checker when purchasing new curricular materials? Has the department/unit taken steps to ensure part-time faculty are using accessible instructional materials?

The faculty plans to participate in accessibility workshops and explore book publisher's resources to make instructional materials accessible to students with disabilities.

4.A. Curriculum Mapping

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Program learning outcome #1: Perform both laboratory and field experiments using the scientific method, which requires observation, hypothesis testing, data collection, and the application of basic ecological principles to explain results.
Program learning outcome #2: Demonstrate effective oral and written communication, teamwork and collaboration in scientific, mathematical, and other settings.
Program learning outcome #3: Explain the impacts of different environmental pollutants and critically evaluate various pollution mitigation efforts in the context of regional and global policies, economics, and politics.
Program learning outcome #4: Explain major impacts of human activities on environmental quality and identify and assess solutions to current and potential environmental problems, such as global climate change, biodiversity loss, and human population growth and use of natural resources.

 Course #1: ENV 101

   • Course SLOs state students will 1) propose a scientific question pertinent to environmental science, gather evidence concerning this question, and make and defend conclusions based on the evidence gathered using appropriate information technology, 2) use graphical, symbolic, and numerical methods to analyze, interpret, and explain the interactions between biotic and abiotic components of the environment, 3) list and explain major impacts of human activities on environmental quality, 4) identify and assess solutions to current and potential environmental problems.
Course #2: NRES 100

   • Course SLOs state students will 1) describe key components of ecosystems and explain their interactions, 2) describe the movement of energy, nutrients, and toxins through ecosystems, 3) list and describe the sources and effects of major environmental problems, and 4) describe scientific and/or technological solutions applied to deal with environmental

problems.
Course #2: NRES 210

• Course SLOs state students will 1) identify major environmental pollutants and the major sources and impacts of each on people and environment, 2) explain climate change and describe some of its consequences, 3) compare benefits and drawbacks associated with different energy sources we use, 4) describe trends in the production and management of solid waste, and 5) identify and describe management approaches pertinent to modern environmental problems.
Course #3: NRES 210

• Course SLOs state students will 1) identify major environmental pollutants and the major sources and impacts of each on people and environment, 2) explain climate change and describe some of its consequences, 3) compare benefits and drawbacks associated with different energy sources we use, 4) describe trends in the production and management of solid waste, and 5) identify and describe management approaches pertinent to modern environmental problems.

Map Origin: Associate of Science, Environmental Science
Map Target: Associate of Science, Environmental Science

Associate of Science, Environmental Science

Attainment Levels:
M: Mastered
RM: Reinforced/Mastered
DM: Demonstrated/Mastery
PR: Practiced/Reinforced
IRD: Introduced/Reinforced/Demonstrated
IPD: Introduced/Practiced/Demonstrated
DP: Practiced/Demonstrated
D: Demonstrated
IP: Introduced/Practiced
P: Practiced
R: Reinforced
I: Introduced

Once your map is complete, please analyze the following:

  • **PLOs: Do all PLOs still reflect what you want students to demonstrate once they complete the program? Are there any PLOs that need to be updated?**
  • **Potential gaps and redundancies: Are there any PLOs that are not addressed in the curriculum? Are there any unwanted redundancies of PLOs in the curriculum?**
  • **CLO alignment: Is there a need to modify any course learning outcomes so that courses better support PLOs?**
  • **Course sequencing: Is there a need to modify the course sequencing, so students have a more seamless learning experience?**
  • **Curriculum and learning opportunities: Is it necessary to introduce new learning opportunities to reinforce learning? These could be modules or assignments in courses, additional courses, and/or co-curricular opportunities that would be required of all students in the program.**
  • **Other?**

  • PSLOs #3 and #4 are redundant and will be consolidated. PSLOs will be updated to include the following objective: Describe key components of ecosystems and explain their interactions.
  • CSLOs of ENV 101, and NRES 100, NRES 210 will be reviewed regularly for potential updates to ensure consistency with PSLOs, class instructions, and assessment.
  • NRES 217 is offered for the first time in Spring 2021 and its CSLOs have not been assessed. CSLOs of NRES 217 will be reviewed regularly for potential updates to ensure consistency with PSLOs, class instructions, and assessment.

4.B. Evidence of Program Learning Outcomes Assessment

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Now that you have completed your curriculum map, summarize the most significant *program* assessment results since your last PUR. These will come from any data we have available in eLumen as well as past assessment reports. Please discuss these findings as they relate to the program and program learning outcomes, not just individual courses.

Program learning outcome #1: Perform both laboratory and field experiments using the scientific method, which requires observation, hypothesis testing, data collection, and the application of basic ecological principles to explain results.

Program learning outcome #2: Demonstrate effective oral and written communication, teamwork and collaboration in scientific, mathematical, and other settings.

Course #1: ENV 101

• Course SLOs state students will 1) propose a scientific question pertinent to environmental science, gather evidence concerning this question, and make and defend conclusions based on the evidence gathered using appropriate information technology, 2) use graphical, symbolic, and numerical methods to analyze, interpret, and explain the interactions between biotic and abiotic components of the environment, 3) list and explain major impacts of human activities on environmental quality, 4) identify and assess solutions to current and potential environmental problems.
• CSLO #1 was assessed using scientific reports produced by students. Students collected data working in team, analyzed and reported those data using graphical, symbolic, or numerical methods, and made and defended conclusions based on evidence gathered. Reports were evaluated for thoroughness, organization, synthesis, and clarity using a pre-determined rubric. In spring 2019, 73% of students formulated conclusions that were clear, complete, and mostly consistent with data or evidence was well as mostly addressed the nuances or deeper implications. Some students made errors in their interpretation of hypothesis and some were unable to clearly explain how results supported conclusions. This CSLO directly maps to PSLO #1 and #2. In spring 2019, 27 % of students scored exemplary, 47 % scored proficient, and the rest scored marginal and poor. Follow up actions: Findings were discussed with part-time instructors. Instructors were encouraged to include lecture tutorial to help students practice with the development of testable hypotheses and stress the importance of supporting conclusion by results and discussing implications of research findings.
• CSLO #2 was assessed was assessed using scientific reports produced by students. Students collected data working in team, analyzed and reported those data using graphical, symbolic, or numerical methods, and made and defended conclusions based on evidence gathered. Reports were evaluated using the following pre-determined rubric. In spring 2019, 81 % of students were able to use raw data to perform statistical analysis, and report and interpret results relevant to their hypothesis. Some students provided data with no explanation or interpretation. Some did not include charts in their reports. This CSLO directly maps to PSLO #1 and #2. In spring 2019, 62% of students scored exemplary, 19 % scored proficient, and the rest scored marginal and poor. Follow up actions: Continued to use same instructions with slight adjustment to enable some students to correctly calculate and interpret test statistic. Significance of explaining data in tables/figures to support conclusions were emphasizes to students. Results were discussed with part-time instructors.
• CSLO #2 was also measured using oral presentations created by students in PowerPoint that represented results of independent research focused on a specific problem or concept related to environmental science. About 82% of the students used a variety of information sources for independent research on environmental science topics and many used websites or news articles for their information demonstrating effective oral and written communication skills in scientific research. This CSLO directly maps to PSLO #2. In spring 2019, 74% of students scored exemplary, 8 % scored proficient, and the rest scored marginal and poor. Follow up actions: Continue to use the same instructions/guidelines with slight adjustment to enable some students to use variety of legitimate information sources for independent research

Course #2: NRES 210

- Course SLOs state students will 1) identify major environmental pollutants and the major sources and impacts of each on people and environment, 2) explain climate change and describe some of its consequences, 3) compare benefits and drawbacks associated with different energy sources we use, 4) describe trends in the production and management of solid waste, and 5) identify and describe management approaches pertinent to modern environmental problems.

- CSLOs #1 and #5 were assessed using scientific reports produced by students. Students produced scientific research papers on a specific problem or concept related to environmental pollution by gathering/examining information in peer-reviewed literature, analyzing and reporting that information, and making and defending conclusions based on evidence gathered. Reports were evaluated for thoroughness, organization, synthesis, and clarity using a pre-determined rubric. More than 70% of the students were able to explain and draw reasonable conclusions on major environmental pollution issues and their solutions in their scientific research papers. Some students failed to use peer reviewed journal articles to gather evidence to support their conclusions. Follow up actions: Continue to use the same instructions/guidelines with slight adjustment to stress the importance of using peer reviewed journal articles in scientific research. Enable some students to use valid information sources for independent research by inviting librarian to discuss peer reviewed journal articles and how they can be accessed using library resources. These CSLOs directly map to PSLO #2.

Program learning outcome #3: Explain the impacts of different environmental pollutants and critically evaluate various pollution mitigation efforts in the context of regional and global policies, economics, and politics.

Program learning outcome #4: Explain major impacts of human activities on environmental quality and identify and assess solutions to current and potential environmental problems, such as global climate change, biodiversity loss, and human population growth and use of natural resources.

Course #1: ENV 101

- Course SLOs state students will 1) propose a scientific question pertinent to environmental science, gather evidence concerning this question, and make and defend conclusions based on the evidence gathered using appropriate information technology, 2) use graphical, symbolic, and numerical methods to analyze, interpret, and explain the interactions between biotic and abiotic components of the environment, 3) list and explain major impacts of human activities on environmental quality, 4) identify and assess solutions to current and potential environmental problems.

CSLOs #2, #3, and # 4 were measured using *in-class* pre-course /post-course test. Overall, normalized learning gains (Hake Gain) of > 0.5 were achieved by students in many course sections for these outcomes indicating positive results. Students achieved lower Hake Gain for specific questions related to population variables, fundamentals of climate change, biodiversity, wastewater treatment, and air pollution. More interactive learning strategies such as lecture tutorial, Think Pair Share, and clicker questions using Nearpod were incorporated to help students become better in these topics. Improvement strategies were discussed with part-time instructors. These CSLOs directly map to PSLOs #3 and #4.

Course #2: NRES 100

- Course SLOs state students will 1) describe key components of ecosystems and explain their interactions, 2) describe the movement of energy, nutrients, and toxins through ecosystems, 3) list and describe the sources and effects of major environmental problems, and 4) describe scientific and/or technological solutions applied to deal with environmental problems

- CSLOs # 3 and #4 were measured using *in-class* pre-course /post-course test. Overall, normalized learning gains (Hake Gain) of > 0.5 were achieved by students for these outcomes indicating positive results. Students achieved lower Hake Gain for specific questions related to sustainable development, feedback mechanism, greenhouse effect, nutrient recycling, and air

quality. Active learning strategies such as lecture tutorial, Think Pair Share, and clicker questions using Nearpod were incorporated to help students become better in these topics. Improvement strategies were discussed with part-time instructors. These CSLOs directly map to PSLOs #3 and #4.

Course #3: NRES 210

   • Course SLOs state students will 1) identify major environmental pollutants and the major sources and impacts of each on people and environment, 2) explain climate change and describe some of its consequences, 3) compare benefits and drawbacks associated with different energy sources we use, 4) describe trends in the production and management of solid waste, and 5) identify and describe management approaches pertinent to modern environmental problems.
   • These CSLOs were measured using *in-class* pre-course /post-course test. For CSLOs #1, #4, and # 5, normalized learning gains (Hake Gain) achieved by students were between 0.3 and 0.5 indicating moderate gain. For CSLOs #2 and #3, Hake Gains of > 0.5 were achieved by students indicating positive results. Students achieved lower Hake Gain for specific questions related to dose response analysis, ocean acidification, environmental laws, mercury pollution, fate of pollutants in environment, sanitary landfill, solutions for air pollution, and environmental toxicology. Active learning strategies such as lecture tutorial, Think Pair Share, group discussion, and clicker questions using Nearpod were incorporated to help students become better in these topics. These CSLOs directly map to PSLOs #3 and #4.

Describe how plans were implemented to try and improve teaching and learning. What changes did you make to the program based on assessment results and improvement plans?

More interactive learning strategies such as lecture tutorial, Think Pair Share, and clicker questions using Nearpod were incorporated in teaching to help improve student learning. Same instructions were used for topics where student showed significant learning gain. Results of assesement and improvement strategies were discussed with part-time instructors.

4.C. General Education Outcomes Assessment

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

   • **Identify which general education learning outcomes (GELOs) you assessed and summarize the most significant assessment results.**
   • **Describe how plans were implemented to try and improve teaching and learning in general education (GE). What changes did you make assessment results and improvement plans? Do any CLOs need to be changed to meet GE assessment requirements?**

General Education Learning outcome #1: Students will draw valid conclusions.
General Education Learning outcome #2: Students will use the mathematics appropriate to a particular problem to obtain correct solutions.
General Education Learning outcome #3: Students will use information sources to accomplish a specific purpose.

Course: ENV 101

- Course SLOs state students will 1) propose a scientific question pertinent to environmental science, gather evidence concerning this question, and make and defend conclusions based on the evidence gathered using appropriate information technology, 2) use graphical, symbolic, and numerical methods to analyze, interpret, and explain the interactions between biotic and abiotic components of the environment, 3) list and explain major impacts of human activities on environmental quality, 4) identify and assess solutions to current and potential environmental problems.
- CSLO #1 was assessed using scientific reports produced by students. Students collected data working in team, analyzed and reported those data using graphical, symbolic, or numerical methods, and made and defended conclusions based on evidence gathered. Reports were evaluated for thoroughness, organization, synthesis, and clarity using a pre-determined rubric. In spring 2019, 73% of students formulated conclusions that were clear, complete, and mostly consistent with data or evidence was well as mostly addressed the nuances or deeper implications. Some students made errors in their interpretation of hypothesis and some were unable to clearly explain how results supported conclusions. This CSLO directly maps to GELO #1. In spring 2019, 27 % of students scored exemplary, 47 % scored proficient, and the rest scored marginal and poor. Follow up actions: Findings were discussed with part-time instructors. Instructors were encouraged to include lecture tutorial to help students practice with the development of testable hypotheses and stress the importance of supporting conclusion by results and discussing implications of research findings.
- CSLO #2 was assessed was assessed using scientific reports produced by students. Students collected data working in team, analyzed and reported those data using graphical, symbolic, or numerical methods, and made and defended conclusions based on evidence gathered. Reports were evaluated using the following pre-determined rubric. In spring 2019, 81 % of students were able to use raw data to perform statistical analysis, and report and interpret results relevant to their hypothesis. Some students provided data with no explanation or interpretation. Some did not include charts in their reports. This CSLO directly maps to GELO #2. In spring 2019, 62% of students scored exemplary, 19 % scored proficient, and the rest scored marginal and poor. Follow up actions: Continued to use same instructions with slight adjustment to enable some students to correctly calculate and interpret test statistic. Significance of explaining data in tables/figures to support conclusions were emphasizes to students. Results were discussed with part-time instructors.
- CSLO #2 was also measured using oral presentations created by students in PowerPoint that represented results of independent research focused on a specific problem or concept related to environmental science. About 82% of the students used a variety of information sources for independent research on environmental science topics and many used websites or news articles for their information demonstrating effective oral and written communication skills in scientific research. This CSLO directly maps to GELO #3. In spring 2019, 74% of students scored exemplary, 8 % scored proficient, and the rest scored marginal and poor. Follow up actions: Continue to use the same instructions/guidelines with slight adjustment to enable some students to use variety of legitimate information sources for independent research

4.D. Five-year Course Assessment Cycle

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Prefix	Course #	Gen Ed	Course	As Taught	Spring 2020	Fall 2020	Spring 2021	Fall 2021	Spring 2022	Fall 2022	Spring 2023	Fall 2023	Spring 2024	Fall 2024	Spring 2025
ENV	101	Y	INTRODUCTION TO ENVIRONMENTAL SCIENCE						X						X
ENV	198	N	SPECIAL TOPICS IN ENVIRONMENT	X											
ENV	290	N	INTERNSHIP IN ENVIRONMENTAL STUDIES	X											
ENV	299	N	SPECIAL TOPICS IN ENVIRONMENTAL SCIE	X											

			NCE														
NRES	100	N	PRINCIPLES OF NATURAL RESOURCES & ENVIRONMENTAL SCIENCES						X								X
NRES	210	N	ENVIRONMENTAL POLLUTION					X								X	

This question has not been answered yet

5.A. FTE, Section Count, Course Fill Rate, and Unsuccessful Enrollment Attempts

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

FTE, Section Count, and Course Fill Rate

Enrollment in ENV courses					Enrollment in NRES courses			
Academic year	**FTE**	**Section count**	**Fill rate**		**Academic year**	**FTE**	**Section count**	**Fill rate**
15-16	61.8	14	76		15-16	14.4	3	81
16-17	70.6	14	84		16-17	14.8	3	83
17-18	93.4	19	89		17-18	16.4	2	95

| 18-19 | 96.8 | 18 | 94 | | 18-19 | 8.8 | 2 | 79 |
| 19-20 | 127 | 25 | 91 | | 19-20 | 8.4 | 2 | 75 |

Five-year change FTE, Sections/Average			
	FTE	**Section count**	**Average fill rate**
ENV	105%	79%	88%
NRES	-42%	-33%	84%
Division	-1%	30%	81%
TMCC	-6%	8%	71%

Over the past 5 years, ENV has a 105% increase in FTE enrollment while the college dropped 4% and Math and Physical Sciences Division dropped 1%. ENV has increased 88% in sections offered while successfully maintaining 88% average course fill rate, which is above the fill rates of both the Division and TMCC. Significant increase in ENV enrollment is likely due to the interest of students in environmental issues which are part of the forefront of national and international scenes. Increase in ENV enrollment is also likely because ENV 101 fulfills General Education requirement at TMCC as well as at UNR where ENV 101 fulfils General Education core objective 4: Core Physical & Natural Phenomena. To accommodate student needs, the department has started to offer late-start sections.

NRES has maintained 84% average course fill rate which is above the fill rates of the Division and TMCC. The department stopped offering NRES 210 which explains 33% decline in section count and 42% decline in NRES FTE. The department has started to offer NRES 217 from spring 2021 which is likely to increase the NRES section count and FTE in future.

Please analyze and discuss the trends you see in FTE and section counts, including how they compare to those of the division and College. Discuss any factors that could have led to significant trends or shifts in enrollment and sections offered.

Please analyze the default settings first. Then, you may use the drop-down menus to examine more disaggregated data sets. If you describe any trends in these more specific data,

please include a screen shot of the data to accompany your discussion.

Please analyze and discuss the trends or shifts you see. Discuss any factors that could have led to significant trends or shifts in course fill rate and unsuccessful enrollment attempts.

Please analyze the default settings first. Then, you may use the drop-down menus to examine more disaggregated data sets. If you describe any trends in these more specific data, please include a screen shot of the data to accompany your discussion.

Course fill rate and unsuccessful enrollment attempts (5-year average)		
	Fill rate	**# Unsuccessful attempts**
ENV 101	91%	77
NRES 100	96%	3
NRES 210	61%	2
Division	81%	22
TMCC	71%	9

Five-year average fill rates for ENV 101 and NRES 100 are above those of the Division and TMCC while the five-year average fill rates NRES 210 are below those of the Division and TMCC. The number of unsuccessful attempts to enroll in ENV 101 is significantly higher than the number of unsuccessful attempts to enroll in other courses of the division and TMCC, suggesting that the department should consider adding more ENV 101 sections to meet student enrollment needs.

5.B. Student Demographics: Ethnicity, Gender, Credit Load, Student Status, and Age Range

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Briefly describe the typical student profile in terms of ethnicity, gender, credit load, student status, and age in your program/unit. Please note and discuss any reasons why the demographics of students in your program noticeably differ from TMCC's student demographics. Please note any potentially underserved student populations and the reasons why they may exist.

Demographic of student in Environmental Science Courses				
Fall 2019				
	ENV	**NRES**	**Declared Major s (Physical Sciences)**	**TMCC**
Credit Load				
Full-time	56.7%	57.1%	39.8%	28.2%
Part-time	43.3%	42.9%	60.2%	71.8%
Status				
New	14.2%	11.4%	23.6%	14.6%
Continuing	73.8%	77.1%	69.0%	62.1%
New Transfer	5.3%	11.4%	7.4%	8.7%
New High School	2.1%	0	0	11.1%
Continuing HS	4.6%	0	0	3.5%
Age				
<18 yrs	5.7%	0	0.2%	12.7%
18-24 yrs	72.3%	68.6%	69.5%	52.9%
25-35 yrs	17.4%	31.4%	27.3%	22.2%
35-49 yrs	3.2%	0	2.6%	9.0%
50+ yrs	1.4%	0	0.4%	3.3%

Gender				
Female	48.6%	57.1%	17.7%	54.3%
Male	51.4%	42.9%	82.3%	45.7%
Unreported	0	0	0	0
Ethnicity				
International	0	0	0.4%	0.3%
American Indian	2.1%	5.7%	0.6%	1.0%
Asian	5.3%	2.9%	6.9%	5.8%
Black	2.5%	0	3.7%	5.8%
Hawaiian/PI	0	0	0	0.1%
Hispanic	34.4%	20.0%	37.7%	32.3%
Caucasian	48.9%	65.7%	44.2%	51.7%
2+ Races	4.6%	5.7%	5.0%	4.2%
Unknown	2.1%	0	1.5%	1.7%

CREDIT LOAD, AGE, AND STATUS
Majority of students taking ENV and NRES courses attend school on a full-time basis; college wide, majority of the students attend school on a part-time basis. The ratio between full-time and part-time students taking ENV is 56.7% to 43.3% and NRES is 57.1% to 43.9%, whereas college wide, the ratio between full-time and part-time students is 28.2% to 71.8%. This difference is likely because many students taking ENV and NRES course enroll in college directly or soon after high school to earn their degree at TMCC and advance to UNR or other four-year institutions for further education, or to join the workforce. This reason also reflects the larger percentage of ENV and NRES students in the 18-24 age range and the lower percentage of 35+ age range compared to TMCC. Majority of students taking ENV (73.8%) and NRES (77.1%) are continuing; college-wide, 62.1% of the students are continuing.

GENDER AND ETHNICITY
Proportion of ENV students is fairly equal between genders (female: 48.6%; male: 51.4%). Proportion of NRES students between female and male is 57.1% and 42.9% respectively, which is fairly similar to college wide gender ratio (female: 54.3%; male: 45.7%). In terms of ethnicity, percentages of ENV students are comparable to those of the college with the exception that the percentage of American Indian students (2.1%) is slightly higher, and the percentage of Black students (2.5%) is lower than those of the college

(American Indian: 1%; Black: 5.8%). In NRES, percentages of Caucasian students (65.5%) and American Indian students (5.7%) are higher and percentage of Hispanic students (20%) and Asian students (2.2%) are lower than those in college (Caucasian: 51.7%, Amercain Indian: 1%; Hispanic: 32.3%; Asian: 5.8%). These data suggest that the program should increase effort to increase enrollment in ENV and NRES from some underrepresented groups.

6.A. Course Completion

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Please describe any substantial trends or shifts that you see in overall course completion rates and successful completion (C or better). What might these trends or shifts mean? Discuss any factors that could have led to these trends or shifts in the data. Next, disaggregate the data by student demographics and describe any substantial trends. An educational equity gap is where there is a significant and persistent disparity in educational attainment between different groups of students. Are there any equity gaps in course completion or successful completion rates?

Pass Rate in Environmental Science Program Courses					
	Average Course Pass Rate				
Academic year	**ENV**	**NRES**	**Division**	**TMCC**	
15-16	86%	89%			
16-17	83%	91%			
17-18	81%	88%			
18-19	80%	84%			
19-20	80%	93%			
5-year Avg.	81%	89%	69%	79%	

The overall pass rates for ENV and NRES courses has stayed above 80% over the past 5 years. The 5-year average for ENV is 81% which is higher than that of Division (69%) but comparable to that of TMCC (79%). The 5-year average for NRES is 89% which is higher than those of the Division (69%) and TMCC

(79%). High pass rates in ENV and NRES courses are likely due to active learning strategies used by instructors to promote student learning. Environmental science instructors use variety of pedagogical techniques to enhance student learning, including formative assessment using polling, discussions, group work, clearly stated learning outcomes, use of technology, and student engagement with learning activities. Additionally, following activities are likely to have contributed to high pass rates in ENV and NRES courses: 1) instructors use Starfish to contact students that are at risk of failing, 2) instructors encourage students to audit the course rather than withdraw, and 3) instructors encourage students to use tutoring services and instructor's office hours to learn difficult course materials.

6.B. Graduation and Transfer

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Please discuss any trends or shifts that you see in overall graduation and transfer. Next, disaggregate the data by student demographics and describe any substantial trends. An educational equity gap is where there is a significant and persistent disparity in educational attainment between different groups of students. Are there any equity gaps in graduation or transfer?

Degrees awarded	
Academic year	**ENV-AS**
15-16	0
16-17	0
17-18	2
18-19	4
19-20	3
Total	**9**

Over the past five years, 9 A.S. Environmental Science degrees were awarded by the Physical Sciences department. Overall, there is a positive trend in the number of students completing the degree. Physical Sciences department awarded 84 A.S. degrees in this time period. The number of A.S Environmental Science degrees awarded was higher than the number of A.S. Chemistry

degrees (6) but lower than the number of A.S. Computer Science degrees (35) and the number of A.S. Engineering degrees (34).

7.A. Faculty Achievement

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Describe the program/unit's full-time (FT) faculty credentials, experience, and highlights of significant activities and/or contributions to TMCC. Please use the format below for each FT faculty member.

- **Faculty Name, FTE**
- **Degree(s) or professional certification(s) awarded, discipline, awarding institution**
- **Substantial accomplishments or contributions to the community, especially those related to education or your discipline (e.g. mentoring, community service) (please limit to 3)**
- **Number of years teaching at TMCC**
- **Total number of years in academia**
- **Primary courses taught**
- **Significant activities or contributions made to TMCC (Please limit to 3)**

Sameer Bhattarai
FTE:1
Degrees: Ph. D., Environmental Science and Public Policy, George Mason University, Virginia
           M.S., Environmental Analysis and Management, Troy University, Alabama
           B.S., Environmental Science, Tribhuvan University, Nepal
Accomplishments: Mentored students for undergraduate research. Mentored students to prepare scholarship grant proposals. Received TMCC Foundation faculty and staff Innovation Grant.
Number of years teaching at TMCC: 7 years
Total number of years in academia: 17 years
Primary courses: ENV 101, NRES 100, NRES 210, NRES 217.
TMCC contributions: Received NSF Nevada EPSCOR grant award to involve student in undergraduate research. Mentored students in NASA sponsored undergraduate research. Mentor new and part-time Environmental Science

Instructors.

7.B. FT/PT Faculty and Student Credit Hours Taught

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Describe the trends or shifts in the number of full-time (FT) and part-time (PT) faculty, and the number of student credit hours (SCH) taught by FT and PT faculty since the last program/unit review. What Impact, if any, have these trends or shifts had on the program/unit?

	Faculty Headcount and FTE			
	Full-Time		Part-Time	
	Headcount	FTE	Headcount	FTE
Fall 2015	2	1.37	2	0.4
Fall 2016	1	1	3	0.8
Fall 2017	1	1.2	4	0.8
Fall 2018	1	1.4	3	0.6
Fall 2019	1	1.4	6	1.2

	Student Credit Hours (SCH) Taught			
	Full-Time		Part-Time	
	SCH	% SCH	SCH	% SCH
Fall 15	432.5	82%	96	18%
Fall 16	432	68%	201	32%
Fall 17	495	62%	309	38%
Fall 18	525	69%	231	31%
Fall 19	492	51%	480	49%

While the number of full-time faculty teaching ENV and NRES courses has not changed in the last five years, the number of part-time faculty has increased substantially. The percentage of student credit hours taught by full-time as compared with part-time appears to have moved in a downward trend. This trend is due to multiple sections of ENV 101 offered to meet the high demand for the course which fulfils General Education requirement.

7.C. Support Staff

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Describe the program/unit's support staff, including their FTE, major duties, and any specialized credentials necessary to carry out their duties. Is the number of staff adequate to support the program/unit? Explain.

Administrative Assistant III, 1.0 FTE:
The Physical Sciences Department in which Environmental Science program is housed has a 1.0 FTE Administrative Assistant III – Ms. Lee Anderson. The position supports 10 full-time faculty for the Physical Sciences Department as well as more than twenty part-time faculty. The AA-III is responsible for managing full-time and part-time faculty contracts, maintaining operating budgets, data entry for class schedules, textbook orders, faculty travel, office supplies, assisting students by answering questions and facilitating course enrollments, course cancelations, preparing LOA, assisting part-time instructors, collecting electronic syllabi each term from all instructors, cancelling classes due to faculty illness/absence, and posting cancellations on the appropriate classroom door. Currently, this position is adequate to support the ENV program. Ms. Anderson holds a B.A. in Art History/Museum Science.

Laboratory Technician 2, 0.53 FTE:
The ENV program is supported by a Laboratory Technician 2 – Ms. Sydnee Franzwa, who oversees the day-to-day operations of the environmental science labs by ensuring that materials are purchased and prepared for all lab activities. Currently, this position is adequate to support the ENV program. Ms. Franzwa holds B.S. in Biology.

7.D. Facilities and Technology

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Describe the facilities and technology used by the program/unit, and discuss any unique requirements. These may include labs, studios, off-campus sites, computer classrooms, specialized equipment, etc. Are program/unit facilities and technology adequate to support the program? Explain.

The majority of ENV and NRES sections are offered in traditional classrooms. The four mandatory labs of NRES 100 are offered in teaching laboratories RDMT 303 and RDMT 304 at the Dandini Campus, Red Mountain Building. Both laboratories are equipped with the necessary components/technologies such as student work benches, computer workstations, chemical fume hoods, analytical balances, spectrophotometer, water quality test kits, and sinks for classroom instruction and/or hands-on training. Computers are appropriately equipped with softwares such as MS Word, MS Excel, MS PowerPoint, and internet connections to provide students with resources for internet research, data analysis, and report writing. The laboratory space RDMT 306 is used as a store room for Environmental Science lab supplies. Currently, these facilities and technology are adequate to support the ENV program.

8.A. Five Year Plan

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Using the most significant curriculum and assessment-driven findings, and considering any internal or external factors anticipated to impact your program, discuss strategies to sustain or improve student learning. This may also include deactivating existing or introducing new courses or programs to meet student and/or Industry demand.

   • Create transfer agreement for TMCC's A.S. Environmental Science degree to seamlessly transfer to UNR's B.S. degree in Environmental Science. Currently, TMCC has 2+2 agreement with UNR for a transfer of TMCC's A.S. degree to a UNR's B.S. degree in environmental science.
   • Review and revise courses to ensure course objectives are current and relevant.
   • Engage in review and revision of the program to ensure alignment with the

Environmental Science program of UNR. Ongoing.
  • Engage in professional development and training opportunities.

After considering the most significant enrollment findings, and any internal or external factors anticipated to impact future enrollment, discuss strategies, if needed, to improve enrollment or address these factors. These may include, more efficient scheduling, streamlining pathways to completion, outreach to underserved students, etc.

  • Continue to offer late-start and accelerated courses. Ongoing.
  • Schedule courses in different times of the day (morning, afternoon, and evening) and different modalities (in-person and online) to accommodate the needs of diverse TMCC students and ensure timely completion. Ongoing.

With respect to course pass rate, graduation, and transfer, discuss strategies to enhance student success. These may include curriculum changes, streamlining pathways to completion, Improving advising, mentoring, and retention efforts, etc. Address any equity gaps. How does the department or unit plan to improve degree/certificate completion and/or course completion if the department or unit does not offer any degrees/certificates?

  • Maintain and improve the quality of teaching and learning by consistently assessing courses and engaging part-time faculty in the process. Ensure that part-time faculty are provided with appropriate assessment methods. Ongoing.
  • Participate in Assessment Day to "close the loop." Ongoing.
  • Mentor part-time faculty and share appropriate teaching resources that support Student Learning Outcomes. Ongoing.
  • Maintain and improve the quality of teaching and learning by exploring and using new and relevant active learning strategies. Ongoing.
  • Ensure that courses are being assessed in a timely manner based on Course Assessment Schedule. Ongoing.
  • Encourage students to become tutors in ENV and NRES courses and at the Tutoring and Learning Center.
  • Explore opportunities to engage environmental science students in undergraduate research. Ongoing.
  • Work with Learning Commons staff to provide tutoring for difficult topics in ENV and NRES courses. Ongoing
  • Work with librarians to ensure students have knowledge of and access to library resources. Ongoing.

Considering the above strategies, what are the major goals that the department/unit hopes to accomplish in the next 5 years? How does the department or unit plan align with the Academic Affairs Strategic Plan or the College's Strategic Master Plan? Include an estimated timeline of goal completion.

The ENV program aims to accomplish the goals mentioned in the next five years. These goals are designed to promote academic excellence, student success, and access to lifelong learning in alignment with TMCC's Strategic Master Plan Core Themes.

9.A. Resource Requests

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

For each request, please indicate whether the request is for an additional faculty and/or staff position, capital improvements (facilities), technology or specialized instructional resources, or professional development and address the following items:

  • **Request (Additional faculty/staff, capital improvements, technology or other specialized instructional resources, or professional development)**
  • **Estimated time to hire or time the request will be made**
  • **Projected measurable outcomes: What does the program hope to introduce, develop, improve, enhance, accomplish, etc. as a result of the request? Which PLOs and/or student success metrics does the department hope to improve as a result of the request?**
  • **Alignment to the Academic Affairs and College's Strategic Plan**
  • **Institutional Funding Priority: Indicate which of the following institutional funding priorities your request addresses:**

  1. **Compliance with mandates and requirements.**
  2. **Address and/or mitigate issues of liability.**

3. **Address compensation equity.**
4. **Improve efficiency and/or effectiveness.**
5. **Leverage resources, investments with returns.**
6. **Promote professional development.**

While the percentage of student credit hours (SCH) taught by full-time faculty as compared with part-time faculty have moved in a downward trend in the last five year, the ratio of %SCH taught by full-time faculty and part-time faculty (51/49) is comparable to that of college (53/47). Therefore, there seems to be no immediate need to hire a new ENV full-time faculty, but if the downward trend of %SCH taught by full-time faculty as compared with part-time faculty continues, there may be a need for a new tenure-track ENV faculty position. The new full-time position would reduce the time investments in recruiting, hiring, and mentoring of part-time faculty and improve efficiency and effectiveness in delivering ENV and NRES courses.

Additional recurring funding is requested for travel/professional development/training for faculty (+$1700/year) starting FY21. The additional funding will support necessary professional development for faculty to maintain currency in the discipline and empower the faculty to succeed by improving efficiency and/or effectiveness.

Academic Standards and Assessment Committee Findings and Recommendations

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Academic Standards and Assessment Committee's Findings:

This question has not been answered yet

Program Strengths:

1. The AS Environmental Science PLOs are clearly stated and in alignment with the program mission.
2. Removal of NRES211 and addition of NRES 217 strengthens the current 2+2 agreement and allows for an agreement with the AS Environmental Science to be developed.
3. Catalog information is reviewed and updated regularly.
4. NRES courses are offered at consistent times and enrollment in ENV101 is robust.
5. Some discussion regarding use of assessment results to improve the program has occurred (e.g. using think-pair share activities, inviting librarians to the class, etc.).

6. ENV 101 is being assessed regularly with data analysis and reflection occurring. This data section will be valuable for the Physical Sciences General Education PUR.

7. NRES course completion rates are high and outpace the department.

8. There has been discussion of implementation strategies to improve student learning based on curriculum review and assessment (e.g. increased use of Starfish and encouraging students to seek tutoring help, etc.).

Areas of Concern or Improvement:

1. There was minimal progress made towards two of the eight recommendations from the previous PUR and it is unclear why the other recommendations would not apply to Environmental Science.

2. Currently there is a 2+2 agreement with UNR's BS Environmental Science with the AS Transfer degree but not the AS Environmental Science degree.

3. The need for only one section of each NRES course makes it difficult to determine if the time offered is optimal for students.

4. ENV 101 was used for PLO assessment but is not part of the AS Environmental Science degree.

5. There is concern about using BIOL and MATH courses for PLO mapping if there is not appropriate communication between departments/divisions. Only two of the four PLOs appear to have been assessed.

6. Faculty have not completed accessibility training nor have instructional materials been checked for accessibility.

7. There are notable equity gaps for certain ethnicities and female students in regards to program enrollment.

8. Equity gaps in course and program completion rates were noticed but not analyzed.

9. The AS Environmental Science is a low-yield degree and there is a documented decline in program (NRES) enrollment.

10. There appears to be unmet demand for ENV 101.

Recommendations:

1. The Committee recommends reviewing the PLOs (which appear to be from 2010) and updating them as necessary using Bloom's taxonomy language. We recommend meeting with the biology and math departments to assure that the courses used for PLO mapping are accurate. Following review the PLOs should be assessed as soon as possible.

2. We recommend generating an actionable plan to use ENV 101 assessment data to improve GELO achievement.

3. We recommend that a 2+2 transfer agreement with the AS Environmental Science (not the AS Transfer) be established with appropriate BS Environmental Science specializations at UNR be revisited in light of replacing NRES211 with NRES217.

4. We recommend surveying current students to determine if course scheduling is meeting student needs; there may be an opportunity for cohort style learning by following course sequences through the semesters.

5. The Committee recommends that faculty complete accessibility training and work with the DRC and WebCollege as an initial step to check accessibility. Having a base Canvas shell that is accessible for use across courses and sections would be beneficial as would ACUE training which includes information about accessibility.

6. We recommend development of clear implementation strategies to increase enrollment in the AS-Environmental Science degree; this may include marketing of the program, which may include the need for a resource request.

7. The Committee recommends development of mitigation strategies (e.g. working with

Marketing and Communications Office (MCO) for targeted outreach to low enrollment groups or representative advertising, etc.) for noted equity gaps in program enrollment.

8. We recommend disaggregating course pass rate data and graduation data to look for potential equity gaps and, if present, develop mitigation strategies.

9. The Committee recommends developing clear, concrete, and actionable strategies (e.g. working with PT faculty to incorporate active learning techniques, spending more course time on difficult topics, etc.) to sustain or improve student learning.

10. We recommend revision of the 5-year plan that includes clear and actionable strategies to improve the program, includes timelines, and aligns with the Academic Affairs or College Strategic Plan(s) (e.g. review PLOs Sp2022, develop accessible Canvas shell Fa2022, etc.).

11. Resources: We recommend evaluating the possible need for additional PT dollars to support the unmet need for ENV 101 and clarifying how the resource request for additional professional development dollars aligns with improving the program (e.g. identification of specific conferences) and with college plans.

Other comments:

This question has not been answered yet

Dean's Findings and Recommendations

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

Academic Dean's Findings:

Overall, the Environmental Science program at TMCC is a well supported program with one high-quality full-time invested faculty member. The program has courses with notably high successful completion rates. It serves not only students in the AS-Environmental degree path, but also the AAS in Construction and Design and the AS in Secondary Education. The program has well-established course learning outcomes, which measure student learning through scientific reporting and through pre/post test gains. The course student learning outcomes map to the program learning outcomes, and I support the program continually reviewing these to revise and make modifications, as needed, through ongoing assessments while maintaining alignment with transfer programs. The course design reflects invested teaching by the use of interactive teaching strategies to improve student learning.

In an effort to increase external funding for innovative program design, the Environmental Science program obtained an NSF Nevada EPSCOR grant to involve a student in undergraduate research. The research project produced an educational module that was used across multiple sections of ENV 101. The program involved students in undergraduate research sponsored by NASA. Additionally, the program received TMCC Foundation Faculty and Staff Innovation Grant to purchase laboratory equipment.

Strengths:

The Environmental Sciences program maintains one high quality invested full-time tenured faculty member.

The program sees high completion and successful rates in its courses. The overall pass rate has stayed above 80% over the past 5 years. In NRES the course pass rate is 89%, much higher than the college pass rate overall. The program employs engaging teaching strategies to enhance student learning. Outside the classroom, instructors use other tools to help student stay on track, such as the Starfish notification system.

One Full-time faculty member, Sameer Bhattarai, mentors all part-time faculty and oversees curriculum design, thus adding to the consistency in the delivery of the ENV 101 courses.

ENV 101 has seen a robust increase in its offerings over the past 5 years, and the department offers this high demand general education course in various modalities and at various times and campus locations to accommodate student demand.

Sameer Bhattarai was awarded NFS funds to support undergraduate research, which is also a well-known strategy to recruit and retain students in this program.

The program recently consolidated two tracks to align the degree with the B.S. in Environmental Science at UNR. While this is nice for TMCC students, the program needs to review all transfer agreements with UNR, since there are multiple tracks leading to B.S. in Environmental Sciences at UNR.

Areas for Improvement:

The program recently consolidated two tracks to align the degree with the B.S. in Environmental Science at UNR, but there are multiple degree paths in Environmental Sciences at UNR. The program needs to review all transfer agreement to ensure seamless transition for students.

While the proportions of male and female students in the program are on par with the college, efforts still need to be made to recruit and retain some underrepresented groups into these degree paths.

Continue to research ways to increase external funding for innovations and support undergraduate research opportunities.

Continue to review and revise CSLOs and PSLOs with measurable outcomes.

Summary Action Recommended (Continue program(s), significantly revise, discontinue, etc. followed by explanation):

Although the program is considered a low yield program, the program demonstrates a need of delivering high quality general education courses, plus ENV 101 is required for the AAS in Construction and Design and the AS in Secondary Education. Additionally, ENV 101 has seen a 105% increase in enrollment over the past 5 years. My strong recommendation is to continue this program since it fulfills a general education need at TMCC and prepares students to move into higher degrees in Environmental Sciences that are connected to our geographic area,

such as Forestry and Resource Management.

Recommendations and Implementation Timeline:

Recommendation 1: Include curriculum mapping as defined by the PUR process. Although the mapping is described under each CSLO for each course, the actual grid visually depicting the mapping is missing from the report. Additionally, a deeper analysis of the PSLO results need to be included in the PUR to summarize how the program is performing on its program outcomes, and not just the course level outcomes. Immediately.

Recommendation 2: Research ways to strategically increase underrepresented groups in this program Submit recommended strategies by Fall 2022. Possible well-known strategies include more inclusion of experiential learning and close mentoring of students. Hispanic students are a growing demographic that will have an influence on our natural resources, increase awareness may prove to be impactful and increase this demographic. Often lack of internships and scholarships, but addition of more undergraduate research opportunities may increase awareness and recruitment in this program. Funding for summer internships, support research opportunities, and other assistantships may attract these students.

Recommendation 3: Improve language in catalog description and website. Gunning-Fog index calculates that the reading level of the catalog and website program descriptions are at 20 and 19 years. Revise descriptions to a 15 level index to improve readability for prospective students. Fall 2022

Resources Necessary for Implementation of Recommendations:

Funding to support more undergraduate research and experiential learning in these programs.

Impact of Recommendations on Division Planning:

Recommendation 1: A more well defined curriculum map will help faculty to make meaningful improvements in courses, and better prepare students for higher degrees and careers in this field.

Recommendation 2: Increasing opportunities for students to participate in experiential learning and research will increase retention on this program and in the division.

Recommendation 3: Improving the language on the website and catalog will help with students better understand the description of the program.

Impact of Recommendations on Program/Unit Faculty:

All recommendations will help with unit goals to better prepare students for further education and employment with well-planned in-demand high-quality programs as well as enhance student experience through enrichment activities in the classroom such as use of scientific reporting to assess student learning and providing opportunities for undergraduate research.

Vice President of Academic Affairs' Findings and Recommendations

Environmental Science

Physical Sciences (Environmental Science) 2020-21 PUR Self-Study

VPAA's Findings:

This is a high quality program with expert instruction and it serves multiple constituencies. It offers a viable path to transfer to UNR, and the modest number of degree completers offers ample room for growth.

Strengths:

The balance of FT faculty to PT instructors is good, and the proportion of female students in the ENV and NRES courses is nearly par with male students. The course content is strong and the learning outcomes are carefully considered.

Areas for Improvement:

Though there is strong enrollment of female students in ENV and NRES courses, the proportion of females who have declared AS majors overall is just 17.7%, and the proportion of female students who have declared AS Environmental Science is not stated. The demographics of the 9 degree completers are also not provided. This concern affects all AS degrees, of course, but attention needs to be paid to this issue, starting with the data. The division needs to examine its recruiting efforts and prioritize strategies that will engage more female student majors/completers.

The following recommendations made by the Academic Standards and Assessment Committee and Dean are upheld, and/or additional recommendations include the following: (Please include an implementation timeline, and indicate how these recommendations align to the Academic Affairs Strategic Plan and/or the College's Strategic Master Plan.)

I support the recommendations that PSLOs need to be studied closely, URM students need to be engaged, a specific transfer agreement with UNR should be established, and catalog verbiage needs to be simplified. An engaging curriculum map is also a good idea.

The following recommendations made by the Academic Standards and Assessment Committee and Dean are not upheld: (Please provide an explanation.)

There are none.

In order to implement recommendations towards program improvement, the following resource requests are upheld, and/or additional recommended resources include the following:

Resources and support for undergraduate research and experiential learning are recommended, but not specified. Further study of how these efforts can be best supported is needed.

The following resource requests are not upheld: (Please provide an explanation.)

No resources should be allocated toward marketing until the program identifies strategies to increase its recruitment of female and URM student majors.

Summary Action Recommended (Continue program, significantly revise, or discontinue, followed by explanation):

Definitely continue the program.