ACADEMIC

PROGRAM REVIEW:

BS in Biology

May

2025

School of STEM

Diné College

Office of Assessment & Accreditation

Diné College
Academic Program
Review Self---Study

Diné College

Office of Academic Affairs

2025 Academic Program Review

Bachelor of Science in Biology

School of STEM,
May 16 , 2025

CONTRIBUTORS TO THE ACADEMIC PROGRAM REVIEW

SELF-STUDY REPORT

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A. Executive Summary

- Description of the program: Briefly describe the program history, its mission, and the student characteristics of those enrolled in the program.

The BS in Biology began in 2016, supported by the NSF TCUP grant that provided one full time faculty salary and several part time biology faculty salaries, supplies and equipment. The BS in Biology mirrors the classic general biology programs found in regional universities, with some emphasis areas possible in human biology and botany. It has been successfully graduating students since May, 2018. Throughout the years the BS degrees provided foundational knowledge used in the Community College system for transferring to the regional or other universities for higher degrees. Importantly, the BS degrees, including biology, have been used by the Navajo Nation as entry degrees for a variety of technical and semi-technical positions with the Nation that require general understanding of science and biology.

B. Degree Program Overview

- In this section, please provide a brief introduction of the program (including the last time this program was reviewed) with particular attention to how the program supports the mission of the College.

B.1. Historical Background

The AS in Biology started as Life Science in the earliest public record we can find, 1977. Throughout the years the AS degrees provided foundational knowledge used in the Community College system for transferring to the regional or other universities for higher degrees. However, despite the AS degree being in place, there remained a growing need for advanced biology education on campus to enable students to gain deeper knowledge and skills for scientific careers or graduate study without leaving the region. The institution also had a long-term vision to introduce a graduate program in biology, for which the BS degree would serve as a strong foundation. Taking all these factors into consideration, the BS in Biology began in 2016. The BS in Biology mirrors the classic general biology programs found in regional universities, with some emphasis areas possible in human biology and botany. Since its inception, it has been successfully graduating students since May, 2018.

B.2. Congruence with the College Mission

- Discuss how the program supports the College Mission

The College Mission is supported by the BS in Biology:

"Rooted in Diné language and culture, our mission is to advance quality post-secondary student learning and development to ensure the well-being of the Diné People."

Biology involves many aspects of Diné culture and language. Faculty attempt to incorporate Diné language and cultural values and language related to their courses as much as they can, based on their own understanding, and from interactions and assignments with students. Our School of STEM syllabus template has imbedded in it, Diné College Mission values. This example is from a biology writing course, BIO 365:

"**Course Goals as Related to Sa'ah Naaghei Bek'eh Hozhoon:**
The course goals will be related to the Dine Educational Philosophy, Sa'ah Naaghei Bek'eh Hozhoon, the Dine' traditional living system, which places human life in harmony with the natural world and universe. This course will integrate this Diné holistic teaching in accordance with the pedagogical paradigm of *Nitsahakees, Nahat'a, Iina', and Sihasin*, which are processes found in all aspects of nature. Students will understand the self through the teachings of *Naayee'eek'ehgo Na'nitin* (Protection Way Teaching) and *Hozhoojik'ehgo Na'nitin* (Blessing Way Teachings). The goal of this course is to develop within the student a working knowledge of technical biology writing that can be usefully incorporated into their lives. Throughout the course, we will utilize and develop the four phase process of: (1) the *Nitsahakees* ("thinking") phase - preparing ourselves mentally by clearly envisioning and conceiving of our goals and desires in the context of our world and our universe; (2) the *Nahat'a* ("planning") phase - generating plans, images, and models by which we can achieve these goals; (3) the *Ina'* ("living") phase - living and working with the course material in the context of our plans and goals; and (4) the *Sihasin* ("assurance") phase - reflecting on what we have achieved and learned. As we progress through the course, the student will develop clear and substantive understandings of technical biology writing concepts, and the way this knowledge is used to describe, conceive of, anticipate, and understand ourselves and our world. The knowledge, understandings, and insights provided by technical biology writing will aid students in developing and understanding their careers and their lives, so that they can live in greater harmony with their world and their universe."

B.3. **Division Mission**

- Please provide the Divisional Mission that the degree program is designated to, and how the mission aligns to the institutional mission.

Program Mission Statement
The Bachelor of Science in Biology degree at Diné College is a classic program of courses surveying a wide range of disciplines, including molecular, cellular, organismal, and ecological levels of biology. It is designed to promote enhanced knowledge and appreciation of the students' own life and life on earth, while also providing courses and training that will enable students to succeed in our program, develop a career path, pursue graduate studies, obtain employment and promotion in the workforce, and serve the Navajo Nation.

How the missions aligns to the institutional mission: These programs will "…advance quality post-secondary student learning and development to ensure the well-being of the Diné People" because a) they are high quality post-secondary education; b) they ensure well-being of Diné because they provide knowledge of science that is practical to use in everyday life, to understand political policies for informed voting and decisions; and to provide adequate background for a variety of employment options on the Navajo Nation or in the region; and to provide prerequisites for higher academic attainment.

B.4. **Program Purpose**

The BS Biology program meets the needs of the community, the Navajo Nation, and the student demands for the program because it is stably enrolled over time which shows utility and purpose. The BS degrees, including biology, have been used by the Navajo Nation as entry degrees for a variety of technical and semi-technical positions with the Nation that require general understanding of science and biology.

B.5. **Program Goals**

- Please provide the established goals for this degree program.

Program Goal
BS Biology 1. Students will take the core discipline courses for biology to prepare them for a variety of relevant careers, or for further graduate work in biology or related areas. 2. Students will be able to integrate traditional Diné cultural knowledge with the western biological knowledge to improve their sense of self and career fulfillment. 3. Students will understand the importance of graduate work, research, and leadership, relevant to their advancement in the field of biology and knowledge in general. 4. Students will understand the biologically-related problems on the Navajo Nation and how they can help these issues improve through their career and graduate studies and research

- Please provide the established goals for this degree program.

The BS Biology program goals are related to all of the College Strategic goals: Diné Identity (incorporation of Diné cultural values and language into the academic content, and for the following reasons as well), Student Success (the two degree programs provide a background for employment, personal growth, and continuing education), Financial Health (employment and further education possibilities), Institutional Transformation (program enrollment and success provides basis for building higher degrees (MS and Ph.D.), Technology (these STEM programs train students in cutting edge science technologies), Nation Building (student success builds Navajo Nation stability with employment, further education, and informed scientifically literate people).

- Describe all the constituents and stakeholders to the degree program goals:

This would be everyone living and working on the Navajo Nation, in the Region, the US, and the world.

B.6. Progress to Date

- Provide a description of changes made to the program since the last academic program review.

The current checklists provide the best programming to date, considering lessons learned for meeting student needs and fulfilling College and HLC requirements, State of Arizona and New Mexico, and Navajo Nation requirements.

C. **Degree Program Description**

C.1. Curriculum

- At this time, the School should provide a detailed description of the curricula for the degree program including but not limited to the required courses, the general education courses, and the electives within the program.

C.1.a. Required Courses for **BS in Biology:**

BIO 181 General Biology I (4)

Prerequisite: MTH 100, plus ENG 101

One year of high school chemistry or one semester of college chemistry is recommended. This course entails basic principles of structure and function of living things at the molecular, cellular, and system levels of organization. This course meets for three hour's lecture and three hour's

laboratory per week.

BIO 182 General Biology II (4)

Prerequisite: BIO 181 or instructor's permission.

Students deepen their understanding by learning additional principles of structure and function of living things at molecular, cellular, and higher levels of organization. This course meets for three hour's lecture and three hour's laboratory per week.

BIO 205 Microbiology (4)

Prerequisite: BIO 181 and another BIO class (college level) or CHM class.

One semester of college-level chemistry is recommended. Students study micro-organisms and their relationship to health, ecology, and related fields. The field of microbiology is extensive, and in this class emphasis will be on basic principles and their application in medical microbiology. The class will meet for three hour's lecture and four hour's laboratory per week.

BIO 326 Ecology (4)

Prerequisite: BIO 181 and 182. Co-requisite BIO 365

Students are introduced to the concepts and principles of ecology, including organization, function, and development of ecosystems; biogeochemical cycles; population dynamics; and other related topics. This course meets for three hour's lecture and three hour's laboratory per week, which includes field studies and possible weekend field trips.

BIO 340 General Genetics (4)

Prerequisite: BIO 181 and another BIO class (college level).

One semester of college-level chemistry is recommended. Students will survey mechanisms of inheritance (Mendelian and non- Mendelian) and modern molecular genetics, including regulation of transcription and translation, introduction to genomes, understanding the basics of gene transmission, mutation, expression, and regulation, and extra nuclear genomes of mitochondria. This course meets for three hour's lecture and three hour's laboratory per week. Laboratory sessions include utilization of techniques of both classical genetics (with plants, fungi, and invertebrates) and contemporary molecular genetics.

BIO 344 Cellular and Molecular Biology (4)

Prerequisites: BIO 181, CHEM 152.

This course will introduce cell biology and will intro- duce students to the following topics: cell chemistry, DNA replication, cell cycle, transcription, translation, protein, cellular membranes and architecture, and signal transduction pathways. Lab section will emphasize modern methods in molecular biology including restriction fragment analysis, DNA and RNA electrophoresis techniques, molecular cloning, polymerase chain reaction (PCR), DNA sequencing, CRISPR, and transgenic technology. This course is appropriate for those pursing a Bachelor's in Biology or for those interested in molecular basic of life.

BIO 365 Writing in the Biological Sciences (3)

Prerequisites: BIO 182. Co-requisite: BIO 326

This course provides students with practice in biological writing for both technical and non-technical audiences, with the goal of fostering development of effective communication of scientific information by majors in the biological sciences.

BIO 370 Vertebrate Zoology (4)

Prerequisite: Minimum grade of 'C' in BIO 181 or Co-requisite BIO 326

This course is a study of the evolution, diversity, distribution, and ecology of the vertebrates. This course meets for three hour's lecture and three hour's laboratory per week.

BIO 426 Plants and Climate (3)

Prerequisite: BIO 181, 182, Recommended BIO 415, ENV 105, CHM 360.
This is a capstone course which analyzes plant physiological functions, including photosynthesis, transpiration, respiration, energy balance, and interactions with past current climate systems. Three hour's lecture.

BIO 435 Evolutionary Biology (3)
Prerequisite: BIO 182.
This course introduces Evolutionary Principles Evolution of organ- ism, including variation, natural selection, adaptations, population genetics, speciation, patterns and rates of evolution, phylogenetic, and the fossil record.

BIO 498 Senior Seminar (1)
Integrates theory and practice of biological concepts, with emphasis on historical contemporary, and future issues. Letter grade only. May be repeated for a maximum of three units.

BIO 499 Contemporary Developments (1-3)
No repeat limit.
This course examines recent treads and investigations in a selected area of a major field of study. Letter grade only. No repeat limit.

CHM 151 General Chemistry I (5)
Prerequisite: High school chemistry plus MTH 110 or equivalent or instructor's permission.
The first semester of this two-semester sequence presents fundamental concepts of chemistry with an emphasis on theoretical and physical principles; atomic and molecular structure and theory; principles of chemical bonding, and their impact on the properties of gases, liquids, and solids. Laboratory experiments illustrate chemical principles, some of which are quantitative in nature, involving titrimetric and gravimetric methods. Instrumentation in this class includes use of the spectrophotometer. This course meets for four hour's lecture and three hour's laboratory per week.
NOTE: This course is designed for pre-professional, engineering and chemistry majors.

CHM 152 General Chemistry II (4)
Prerequisite: CHM 151.
This course is a continuation of CHM 151. Topics include physical states of matter, equations of state, phase transformations, solutions and colloids, chemical thermodynamics and kinetics, electrochemistry, ionic equilibrium, and instrumental analysis. This course meets for three hour's lecture and three hour's laboratory per week.

CHM 300 Fundamental Organic Chemistry (4)
Prerequisite: CHM 130 or equivalent or instructor's permission.
In this course, students survey modern organic chemistry. Topics include structure, properties, and reactions of the various classes of organic chemicals, such as saturated and unsaturated hydrocarbons, alcohols, halides, carbonyls, and amines. Reaction mechanisms are introduced with examples such as simple synthesis and biochemical reactions. This course is designed for allied health and nursing majors. This class meets for three hour's lecture and three hours of laboratory per week.

CHM 301 General Organic Chemistry I (5)
Prerequisite: CHM 152 or instructor's permission.
This is the first course in a two semester sequence that will study the structure, physical properties, synthesis, and typical reactions of the various series of aliphatic, alicyclic, and aromatic compounds, with attention to reaction mechanisms and applications to living systems. This course meets for four hour's lecture and three hour's laboratory per week.
NOTE: This course is for pre-professional, engineering, and chemistry majors.

CHM 302 General Organic Chemistry II (4)
Prerequisite: CHM 301.
This course is a continuation of CHM 301. Topics include spectroscopic applications in organic chemistry; condensation reactions of carbonyl compounds, rearrangement reactions, and mechanisms; and chemistry of fats, amines, proteins, and carbohydrates. This course meets for three hour's lecture and three hour's laboratory per week.

CHM 360 Fundamental Biochemistry (3)
Prerequisite: BIO 181 and CHM 300 or 301.
Principles of biochemistry emphasizing biologically important compounds and their functions and metabolism in living cells.

MTH 190 Pre-Calculus (4)
Prerequisite: Minimum of grade of 'C' in MTH 110 or instructor's permission.
Preparation for students in STEM majors. The course will cover trigonometry and analytic geometry, including trigonometric functions, analytic trigonometry, laws of sines and laws of cosines, polar equations, vectors, ellipse, hyperbola, and parabola.

MTH 191 Calculus I (4)
Prerequisite: Minimum grade of 'C' in MTH 190 or instructor's permission.
Preparation for students in STEM majors. The course will cover limit and continuity of functions, derivatives, application of differentiation, integrals and fundamental theorem of calculus.

MTH 213 Statistics (4)
Prerequisite: Minimum grade of 'C' in MTH 110 or 114 or instructor's permission.
Cross listed with PSY 213.
Representation of data, measures of central tendency; standard deviation; sampling; normal, chi-square, student's, T and F distributions; and regression and correlation. Basic concepts of experimental design and statistical analysis involved in quantitative research.

PHY 110 Algebra-based Physics I (4)
Prerequisite: MTH 110 or concurrent enrollment or instructor's permission.
An algebra-based introduction to physics sequence designed for science majors who do not require calculus-based physics. Also suitable for general education students with no prior physics background; covers classical mechanics. Trigonometric requirement will be taught in the class. Three hour's lecture and three hour's laboratory per week.

PHY 111 Algebra-based Physics II (4)
Prerequisite: PHY 110 or equivalent course.
Second course in the algebra-based introduction to physics sequence designed for science majors who do not require calculus-based physics. Also suitable for general education student with no prior physics background; covers optics, electricity, and magnetism. Three hour's lecture and three hour's laboratory per week.

PHY 121 Calculus-based Physics I (4)
Prerequisite: MTH 191.
First of three calculus-based courses designed for the science and engineering major with no prior physics background; covers classical mechanics. Three hour's lecture and three hour's laboratory per week.

PHY 131 Calculus-based Physics II (4)

Prerequisite: PHY 121, or instructor's permission.
Second of three calculus-based courses designed for the science and engineering major; covers electricity, magnetism, and optics.
Three hour's lecture and three hour's laboratory per week.

C.1.a. Elective Courses for **BS in Biology**

BIO 201 Human Anatomy and Physiology I (4)
Prerequisite: BIO 181.
Anatomy and physiology is the study of the structure and function of the human body. Selected topics include cells, tissues, and the integumentary, skeletal, muscular, and nervous systems. This course meets for three hour's lecture and three hour's laboratory per week.
BIO 202 Human Anatomy and Physiology II (4)
Prerequisite: BIO 181, 201.
This course is a continuation of the study of the structure and function of the human body. Selected topics include the endocrine, circulatory, respiratory, digestive, urinary, and reproductive systems. This course meets for three hour's lecture and four hour's laboratory per week.
BIO 284 Plant Biology (4)
Prerequisite: BIO 181 and 182
The study of principles and processes in plant biology with emphasis on vascular plants. Students survey the plant kingdom. Course includes study of Native American Medicinal Plants. This course meets for three hour's lecture and three-hour's laboratory per week.
BIO 296 Scientific Research Seminar (1)
The course is for science and engineering majors, but anyone who is interested in learning more about science-related research is also welcome. It offers a broad-based background in current scientific research. Weekly discussions on various methods used in scientific research are covered in the course along with some hands-on research experiences.
BIO 320 Human Pathophysiology (4)
Prerequisite: BIO 201, 202 or instructor's permission. BIO 351 recommended. Faculty provide a survey of disease processes affecting the major organ systems of the body, beginning with cell injury and death, inflammation, repair and defense mechanisms, and disorders of cellular differentiation. Concepts learned will form a basis for understanding the altered physiological states that will be encountered in the health care professions. Four lecture and laboratory.
BIO 351 Developmental Biology (3)
Prerequisites: BIO 182, 340; (can be Co-requisite).
Principles of developmental biology, including the development of major organ systems and their underlying molecular and cellular mechanisms. Illustrated mainly using vertebrate examples.
BIO 385 Comparative Invertebrate Zoology (4)
Prerequisite: BIO 181.
This course involves the survey of Protists through the non-chordate members of Kingdom Animalia. It will use selected taxa to illustrate concepts of evolution, systematics, physiology, morphology, life his- tory, ecology and behavior. Lectures will focus on organizing and interpreting information about invertebrate organisms in order to illustrate evolutionary relationships within and among taxa as well as adaptations that allow species to inhabit specific

habitats. Laboratories will supply models of taxa as described in lecture.

BIO 408 Field Work Experience (1-12)

Pass/Fail; no repeat limit.

Supervised field experience in an appropriate agency or organization

BIO 415 Plant Taxonomy (4)

Prerequisite: BIO 182.

Introduces the principles of plant classification: a survey of flowering plant families of northern Arizona and other temperate families, identification, and preservation of wildflower and grasses. Special topics include origin of major groups, higher level classification, species concepts, speciation, and biogeography.

BIO 425 Animal Physiology (4)

Prerequisite or Co-requisite: BIO 344.

This course examines the function and integration of animal tissue organs, and organ systems in the maintenance of homeostasis. Lab experience in the study of animal tissues, organs and organ systems. Special emphasis on physiological responses and adaptations to environmental extremes, southwestern animal adaptations with application to human adaptations. Three hours of lecture and three hours of laboratory.

BIO 450 Bioinformatics (4)

Prerequisite: BIO 181, 182, 205, 344, CHM 301, 302.

Bioinformatics focuses on the analysis of DNA/RNA sequence data, and this class will include discussion of the mathematical, statistical, and computational techniques use in studying genomes and proteomes. This course teaches biologists the fundamentals of bioinformatics, the application of the tools of computer science (such as programming language and databases) to address biological questions. As biological research becomes increasingly data intensive, literacy in bioinformatics, and experience using, evaluating, and presenting on bioinformatics tools have become essential skills for modern biologists.

BIO 488 Medical Microbiology (4)

Prerequisite: BIO 181, 205, CHM 301, 302

Medical aspects of host-parasite relationships in bacterial, mycotic, rickettsial, and viral diseases of human. This course will cover the challenge presented by various groups of infectious microorganisms. Serves as a guide to the complex subject of infectious disease; constructs on fundamental biological principles to examine different agents of disease. Including the modes of transmission, interaction of pathogens with the host immune system, and the ecological factor facilitating or inhibiting the emergence of epidemic disease, their prognosis, diagnosis and treatment. A wide variety of diagnostic techniques including culturing, staining, ELISA, Immunochromatography, PCR/RT-PCR, Immunoelectrophoresis, and Western blotting will be taught in laboratories.

BIO 495 Cancer Biology (4)

Prerequisite: BIO 181, 340 OR 344, 488, CHM 310, 360.

Fundamental elements of cancer development and progression will be the focus of this course. Basic biochemical and genetic mechanisms of tumorigenesis, including genomic instability, principles of tumor cell invasion and growth dysregulation will be emphasized. The lectures will be organized into 4 broad thematic groups: A) Cell-Autonomous Mechanisms (e.g., tumor suppressor and oncogene function, DNA repair pathways, senescence, apoptosis); B) Non Cell-autonomous Mechanisms (e.g., tumor microenvironment, hypoxia, angiogenesis);
C) Organ Systems (e.g., pancreatic cancer, hematopoietic malignancies); and D) Therapeutic

Approaches (e.g. Protein kinase inhibitors, immunotherapy).

BIO 497 Independent Study (1-6)

Prerequisite: No repeat limit.

Individualized approach to select topics by guided reading and critical evaluation.

BIO 485 Undergraduate Research (1-6)

Prerequisite: repeat up to 12 units.

The course offers original research under the supervision of a re- searcher advisor.

BIO 573 Field Ecology (4)

Applications of ecological issues in the field. Identification of original field research problems in diverse habitats, experimentation, data
analyses, oral presentation of findings, and reports.

CHM 310 Introduction to Pharmacology (4)

Prerequisite: BIO 181, CHM 301, 302.

This course will help our students to gain an ample understanding of the basic concepts related to drug actions, their physicochemical properties and interactions with their specific targets in host. The students will be able to discuss a number of clinically available drugs used to treat infections and diseases. Alongside with a basic under- standing or related topics, this course will develop critical thinking, awareness and understanding of use of these magical bullets through sophisticated thought processes.

MTH 251 Calculus for Life Science and Business (4)

Prerequisites: Minimum grade of 'C' in MTH 190 or instructor's permission.

Differential and integral calculus of elementary functions. Introduces
differential equations. Emphasizes applications to the life sciences
and business**.**

Optional electives: These 3-4 credit opportunities occur during the Junior Fall and Senior Spring, when there is the potential to add a course in addition to the semester requirement: Any 200 to 400 level AGR, BIO, ENV, GLG, NAV 231, PSY, PUH course.

C.1.b. **Concentration/Track:**

BS Students have the opportunity to focus on one of three tracks, or take a variety of courses from these electives:

1. General Biology: BIO 385, Comparative Invertebrate Zoology; 351, Developmental Biology; Optional Electives (see above); Other courses in the two other tracks.
2. Human Biology: BIO 201/202, Human Anatomy and Physiology I/II; BIO 425, Animal Physiology; BIO 320, Human Pathophysiology.
3. Plant Biology: BIO 284, Plant Biology; AGR 323, Molds and Mushrooms; BIO 415, Plant Taxonomy; BIO 426, Plants and Climate.

Table 1. BS Biology Degree Checklist

2025 - 2026 Checklist
Bachelor of Science Degree

Biology (120 credits)

STUDENT: **ID:**

ADVISOR: **DATE:**

COURSE NO. & TITLE	Credit	Transfer	Grade
GENERAL EDUCATION REQUIREMENTS (40-41 hrs)			
COMMUNICATIONS (6 hrs)			
ENG 101 College Composition I	3.0		
ENG 102 College Composition II	3.0		
HUMANITIES/FINE ARTS (6 hrs)			
Student must choose two courses with different prefixes from:			
ARH 110; ARH 211; CW 208; ENG 231; ENG 233; FA 106; FA 115; FA 178;			
HUM 152; LIB 110;			
	3.0		
	3.0		
MATHEMATICS (4.0 hrs based on major)			
or another MTH class as identified by degree program & std placement			
MTH 110 College Algebra	4.0		
NAVAJO STUDIES (9-10 hrs) One NAV course, determined by placement test			
NAV 101,102,201,202 or 211	3.0/4.0		
NIS 111 Foundations of Navajo Culture	3.0		
NIS 221 Navajo History to Present	3.0		
LABORATORY SCIENCES (9 hrs minimum)			
BIO 181 General Biology I	4.0		
CHM 151 General Chemistry I	5.0		
SOCIAL & BEHAVIORAL SCIENCES (6 hrs) 1 HST plus 1 additional crs			
Choice of one: HST 101, 102, 135, 136			
ANT 111;ANT 112; ANT 116; ANT 160; ANT 216; ECO 111; ECO 200; ECO 201;			
NAS 111; NAS 200; NAS 250; POS 111; POS 170; PSY 111; PSY 240; SOC 111;			
SOC 215; SOC 230			
HST	3.0		
	3.0		
Lower Division Requirements (24 - 28 hrs)			

COURSE NO. & TITLE	Credit	Transfer	Grade
UPPER DIVISION REQUIREMENTS (56-80 hrs)			
Junior Semester I:			
Required: BIO 326 Ecology	4.0		
Required: BIO 365 Writing in the Biological Sciences	3.0		
For the 2-semester organic sequence take CHM 301 this semester For the 1-semester organic course, take Optional Elect now, then CHM 230 in SPR			
CHM 235 General Organic Chemistry I	5.0		
Optional Elective crs:	3.0/4.0		
Take one or more Fall Biology Electives (list below)			
Biology Elective:	3.0/4.0		
Biology Elective:	3.0/4.0		
			13-20 hrs
Junior Semester II:			
Required: BIO 370 Vertebrate Zoology	4.0		
Required: BIO 340 General Genetics	3.0		
If taking 1 sem organic minimum req'd take CHM 230, otherwise CHM 236			
CHM 230 Fundamental Organic Chemistry	4.0		
CHM 236 General Organic Chemistry II	4.0		
Take one or more Spring Biology Electives			
Biology Elective:	3.0/4.0		
Biology Elective:	3.0/4.0		
			15-20 hrs
Senior Semester III:			
Required: CHM 360 Fundamental Biochemistry	3.0		
Required: BIO 344 Cellular and Molecular Biology	4.0		
Required: BIO 205 Microbiology	4.0		
Take one or more Fall Biology Electives			
Biology Elective:	3.0/4.0		
Biology Elective:	3.0/4.0		
			14-20 hrs
Senior Semester IV:			
Required: BIO 435 Evolutionary Biology	3.0		
Required: BIO 498 Senior Seminar I	1.0		
Take one or more Spring Biology Electives			

BIO 182 General Biology II	4.0			Biology Elective:	3.0/4.0		
CHM 152 General Chemistry II	4.0			Biology Elective:	3.0/4.0		
MTH 190 Pre-Calculus	4.0			**Take one or more Optional Electives**			
take one or more courses in this option group				Optional Elective Crs:	3.0/4.0		
MTH 213/PSY 213 Statistics	4.0			Optional Elective Crs:	3.0/4.0		
MTH 251 Calculus for Life Science and Business	4.0					**14-20 hrs**	
MTH 191 Calculus I	4.0					**Credits: 56-80 hrs**	
take one of the 2 semester course sequence							
PHY 110 / PHY 111 Algebra-based Physics I & II	4.0/4.0			**FALL** Biology Elect: BIO 201 A & P; BIO 385 Comp Invert Zoo, BIO 425 Anim Phys; BIO 450 BioInfo; BIO 495 Cancer Bio; BIO 485; AGR 323 Molds & Mush **SPR** Biology Elect: BIO 202 A&P; BIO 284 Plant Bio; BIO 351 Devel Bio; BIO 320 Pathophys; BIO 426 Pl & Clim; BIO 488 Med Micro; BIO 485; AGR 433 Pl Patho			
PHY 121 / PHY 131 Calculus-based Physics I & II	4.0/4.0						
		Credits: 64-69 hrs					
Advisor Signature: _____ **Completed all requirements for: AS - _____/ / Conferred:** Courses between double lines are required option groups Minimum 120 hrs required for degree; electives may be needed Optional electives: 200-400 AGR, BIO, CHM, ENV, GLG, NAV 231, PSY, PUH				**Biology Electives in Senior year may include 500 level BIO or NAS courses. Stds can take more than 16 hrs/sem only with 3.00 GPA and Dean's permission** **Students**: Plan your 4 years of courses ahead of time, especially Jr and Sr year. ***NOTE:*** Jr & Sr semesters must have 9 hrs of 300-400 level courses for ONNSFA			
Must pass all courses with "C" grades or higher				***FINAL, April 01, 2025***			

Checklist webpage for BS Biology (log in to WW first):
https://dinportal.jenzabarcloud.com/ICS/Faculty__Staff/Degree_Checklists/

C.2. **Degree Program Organization**

- Please describe the method of communication for this degree program:

College webpages, STEM School brochures, Catalog, Advisors, Professors, STEM Program Coordinator.

- Indicate how reporting and supervising is conducted for both faculty and students alike. An organizational chart could be provided:

The Dean supervises faculties and students, but faculties are the primary supervisors of students.

C.3. **Instruction Method**

- Schools should describe the instructional delivery methods used and whether the program is an interdisciplinary program. If so, then identify which other Schools are included. In addition, it should be noted whether this degree program, in its entirety is offered at other campus sites.

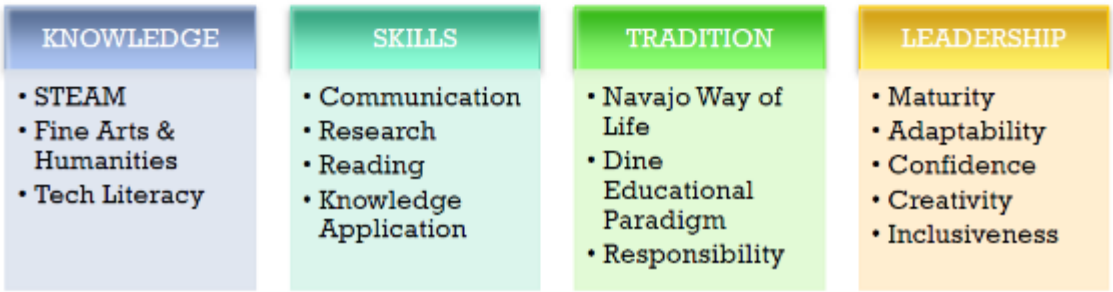
Instructional delivery is face to face lecture and lab, but during pandemic it has been all online. Some courses can be hybrid, i.e., combination of online, Blackboard, face to face lecture and lab. All BS courses are taught in Tsaile. It is possible that the BS program could be entirely done at Shiprock and Tuba City.

C.4. **Student Learning**

- Please provide the established Degree Program Student Learning Outcomes (PSLOs) of this program.

Table 2. Institutional Learn Outcomes which are now required to be referenced with each program PSLO:

Four Pillars			
Institutional Learning Outcomes (ILOs) (Experience over the course of the entire college experience)			
Knowledge	**Skills**	**Tradition**	**Leadership**
Natural & Physical Sciences	Critical thinking	Navajo Culture	Collaboration
Mathematics	Analytical Reasoning	Responsibility	Teamwork
Humanities	Reading Comprehension	Civic Engagement	Confidence
Social & Behavioral Science	Oral Communication Skills	Navajo Language	Global Perspectives
Fine Arts & Media	Written Comm. Skills	Inclusiveness	Capacity for Cont. Learning
Professionalism	Creative Thinking	Life Long Wellness	Maturity
Diverse/Global Cultures	Ethical Reasoning	Self-Reflection	Civic Engagement
Communicate Effectively	Professional Conduct	Navajo History	Social Responsibility
Technology Literacy	Research Skills		Integration of Learning
	Interpersonal Skills		Adaptability
	Planning/Organization		Application of Knowledge
	Quantitative Reasoning		



BS Biology Program Student Learning Objectives

- PSLO 1: Students will be able to recognize and describe the evolutionary and developmental relationships among structure, function, and processes at all biological levels
- PSLO 2: Working on advanced course lab projects and research internships, students will solve problems, apply appropriate scientific methodologies, and quantitatively interpret results through oral and written communication capable of publication and conference oration.
- PSLO 3: Students will integrate their understanding and experience and apply it to understand biological and ecological systems, and conservation of those systems.
- PSLO 4: Students will use and integrate biological themes (evolution, developmental, ecological, conservational) into the Dine way of life, articulating their relationship and importance in presentations and scientific papers.
- PSLO 5: Students will reflect on their competencies, progress within the biology major, and formulate a plan to advance their goals, personal and academic.

- In addition, please provide a description on how the outcomes have been assessed for the last 3 Academic Years. Provide a description of the assessment methods used to evaluate the outcomes and whether the established targets were met.

Below is the PSLO/Course Assessment Matrix which lists PSLO's, their measures, and the courses that are assessed for the measures. Also included are the types of artifacts used for each assessment.

Assessment webpage for BS Biology (log in to WW first):
https://dinportal.jenzabarcloud.com/ICS/Faculty__Staff/Office_of_the_Provost/Office_of_Assessment/Degree_Program_Assessment/BS_Biology/

Table 3. Program Student Learning Outcomes for BS Biology.

Program Outcomes for BS in Biology Majors	BIO 326 Ecology Junior Fall	BIO 365 Writing in Biology Junior Fall	BIO 340 Genetics Junior Spring	BIO 370 Vertebrate Zoology Junior Spring	BIO 344 Cell Biology Senior Fall	CHM 360 Bio-chemistry Senior Fall	BIO 435 Evolution Biology Senior Spring	BIO 498 Senior Seminar Senior Spring	BIO 499 Contemporary Developments Senior Spring
Nitsáhákees – biological knowledge									
Outcome # 1: Students will understand the unity of life and its									

Program Outcomes for BS in Biology Majors	BIO 326 Ecology Junior Fall	BIO 365 Writing in Biology Junior Fall	BIO 340 Genetics Junior Spring	BIO 370 Vertebrate Zoology Junior Spring	BIO 344 Cell Biology Senior Fall	CHM 360 Bio-chemistry Senior Fall	BIO 435 Evolution Biology Senior Spring	BIO 498 Senior Seminar Senior Spring	BIO 499 Contemporary Developments Senior Spring
sequential manifestations. I K									
Measure #1: Atomic, Molecular, Cellular Levels			Art[2]		Art[1]	Art [4]			
Measure #2: Organismal Level				Art[2]			Art[2]		
Nahat'a – modes of inquiry									
Outcome #2: Students will experience the unity of life from the perspectives of different modes of inquiry. I K									
Measure #1: Field Work	Art[5]								
Measure #2: Indoor lab				Art[7]					
Iiná – application of biological knowledge and inquiry									
Outcome #3: Students will integrate their understanding and experience and apply it for the betterment of mankind. R K									
Measure #1: Describe the impact of climate change on biological systems	Art[6]								
Outcome #4: Students will integrate western knowledge and Diné knowledge of life. R K T									
Measure #1: "Explain" the relationships between western									Art [8]

Program Outcomes for BS in Biology Majors	BIO 326 Ecology Junior Fall	BIO 365 Writing in Biology Junior Fall	BIO 340 Genetics Junior Spring	BIO 370 Vertebrate Zoology Junior Spring	BIO 344 Cell Biology Senior Fall	CHM 360 Bio-chemistry Senior Fall	BIO 435 Evolution Biology Senior Spring	BIO 498 Senior Seminar Senior Spring	BIO 499 Contemporary Developments Senior Spring
levels of knowledge and Dine knowledge									
Siihásin – evolution of knowledge and inquiry									
Outcome # 5: Students will reflect on their competencies and progress within the biology major and formulate a plan to advance their goals, personal and academic. M L									
Measure #1: Obtain a professional position or advance to graduate school								Art[9]	
Measure #3: Show advancing abilities in understanding areas of biological interest		Art[11]							Art[10]

Art[1] – paper/rubric
Art[2] – Essay: Why does the genetic and phenotypic variation among lifeforms vary?
Art[4]– pre/post test
Art[5] - lab report/rubric
Art[6] – Essay: Discuss the evolutionary and ecological impacts of climate change on the Navajo Nation
Art[7] – lab report/rubric
Art[8] – paper/rubric
Art[9] – resume or cover letter or letter of employment or post grad survey
Art[10] – paper/rubric
Art[11]– research paper, with writing rubric

Note: Courses and their Artifacts are rated for the PSLOs as ***Introduced, Reinforced, Mastered, or Assessed*** as I, R, M, or A, respectively. Since all PSLOs are assessed, we infer that all PSLOs can be rated as "Assessed".

Note: Institutional Learning Outcomes (ILOs) are required to be indicated for each PSLO. Below are the ILOs. After each PSLO in the Matrix, the corresponding ILOs will be indicated by K for Knowledge, S for Skills, T for Tradition or L for Leadership.

Table 4. Example from 2023-24, the BS Biology artifacts to be collected:

Course	Instructor	When Adminis-tered?	PSLO#/ Measure#	Artifact/ Scoring Rubric?	Collected? Scanned? Uploaded?	When Analyzed? and conclusion (met, partially met, not met)
BIO 326 Ecology	Dr. Arbetan	Fall	2/1 3/1	Lab report; Essay		
BIO 365 Writing	Dr. Webster	Fall	5/3	Res paper		
BIO 340 Genetics	Dr. Hakim	Spring	1/1	Lab report		
BIO 370 Vert Zoo	Dr. Bender	Spring	1/2 2/2	Lab report Lab report		
BIO 344 Cell Bio	Dr. Hakim	Fall	1/1	Res paper		
CHM 360 Biochem	Dr. Verma	Fall	1/1	Pretest/ posttest		
BIO 435 Evolution	Dr. Arbetan	Spring	1/2	Essay		
BIO 498 Seminar	Dr. Hakim & Robinson	Spring	5/1	Resume'		
BIO 499 Contemporary Developments in Biology	Dr. Robinson	Spring	4/1; 5/3	Res paper; Res paper		
Graduation Exit Questionnaire	Dr. Robinson	Fall, Spring	5/1	Questionnaire		

- Indicate how the assessment results were utilized to improve the quality of teaching and student learning.
  - See the 3-year Assessment Report Summary below.

C.4.a. **Program Student Learning Outcomes:**

The Degree Program Assessment Report (DPAR2) for the BS Biology program was done annually prior to 2024-2025 academic year. DPAR1 for BS Biology was done in 2022, which is the 3-year assessment summary, and is due again in 2029, four years from this academic year since we are starting a new Assessment Program this year.

Table 5. Summary Table of results of 2022 DPAR1 (Degree Program Assessment Report, 3-year

Course	Instructor	When Administered?	PSLO#/ Measure#	Artifact/ Scoring Rubric?	Collected?	Conclusion (met, partially met, not met)
BIO 326 Ecology BIO 326 Ecology	Dr. Arbetan Dr. Arbetan	Fall Fall	2/1; 3/1	Lab report (used test Q) Essay	Yes yes	Partially Met Partially Met
BIO 365 Writing	Dr. Webster Dr. Robinson	Fall	5/3	Res paper	Yes Yes	Partially Met Met
BIO 340 Genetics	Dr. Boyd, Prof. Barb Klein	Spring	1/1	Lab report	No	
BIO 370 Vert Zoo	Dr. Bender	Spring	1/2; 2/2	Lab report; Lab report	No	
BIO 344 Cell Bio	Dr. Boyd, Dr. Hakim	Fall	1/1	Res paper	Yes	Met
CHM 360 Biochem	Dr. Begaye	Fall	1/1	Pretest/ posttest	No	
BIO 435 Evolution	Dr. Arbetan	Spring	1/2	Essay	Yes	Partially met
BIO 498 Seminar	Dr.'s Hakim, Robinson	Spring	5/1	Resume or questionnaire	Yes	Met Met
BIO 499 Contemporary Developments in Biology	Dr. Robinson	Spring	4/1; 5/3	Res paper; Res paper	Yes Yes	Met Met
Graduation Exit Questionnaire	Dr. Robinson	Fall, Spring	5/1	questionnaire	Yes	Met

2022 DPAR1 Summary Narrative:

Five courses that were assessed Met their target. However, several other courses were not assessed. If we receive these assessments during this academic year, we will add them to this DPAR1. To increase assessments being done by all faculty, we request the Dean to intervene with training and oversight. We further recommend an "Office of Assessment" be started at the College, with four staff, one for each School, that are responsible for training and helping faculty plan and acquire high quality assessments, and on "closing the loop" for "Not Met" assessments with proper strategic instructional intervention. This is done at many universities nation-wide. Helping to explain one of the missing assessments, for BIO 340, Genetics, the instructor for this course, Dr. Fred Boyd, retired a year ago, and we received no assessments from him when he was here. His replacement instructor did not know to assess this course as well. Furthermore, the pandemic required the unexpected need to switch to online teaching of this classic wet lab technique course, virtually "overnight", beginning Spring, 2020, which we assume made it difficult to perform assessment activities.

- What changes have the faculty made in the program, as a result of an analysis of the assessment of student learning outcomes?

Course assessment outcomes and follow-through for improvements typically involve spending more time covering difficult material that students don't understand well. Further details about this outcome have not been obtained by Biology faculty for this program review.

The new Assessment Program at the College is asking all academic programs to assess their PSLO #1. This is currently being done and will be calculated during the Faculty Assessment Days, May 12 and 13.

C.5. **Curricular Structure**

- Identify and describe the structure, breadth, and depth of the curricular offerings. Describe the changes that have occurred since the last academic program review and the lessons learned. Which changes (if any) made were most useful?

Since the last APR the BS Biology program has not changed in content. However, a revised checklist was written to make it easier to understand for students and advisors. This was requested by the Dean and Registrar. This new checklist, in place since Spring 2024, included lists of electives and alternative courses students can take each semester. These lists were never in the Checklist, but included all courses students could have taken using the Catalog as a reference. BIO 499, Contemporary Developments in Biology, was also made into an elective students could take, rather than a required course, as it had been listed since 2015. This was in response to some biology faculty that thought the course should not be required, and also the Instructors request (Dr. Robinson) because of the unusual effort it took each Spring to arrange for weekly guest speakers. This course was part of the original BS curriculum by vote from biology faculty.

C.6. Diné Identity and Program Uniqueness

The Diné College educational philosophy incorporates key Diné ideologies like *Sa'ah Naagháí Bik'eh Hózhóón* (SNBH) and *K'e*. SNBH describes the corn pollen path that all beings should walk. The path is often described using the four values associated with each of the directions; to the East is *nitsáhákees* or thinking, to the South is *nahat'á* or planning, to the west is *iiná* or living and implementation, and to the north is *sii hasin* or fulfilment and evaluation. Diné College incorporates and uses the four values as a base framework to create curriculum, workplace and college culture, and for college function. In particular, STEM faculty's curriculum often draws on Diné history, perspectives and language to teach important STEM concepts. For example, faculty syllabi often require a reiteration of the SNBH philosophy and how it is incorporated into the course. Oftentimes, to relate to student experience and tap into Diné History, the Faculty will design modules and assignments focused on the unique intersections of Diné history, culture, and western science.

D. **Program Faculty**

• Christine M. Ami cami@dinecollege.edu Ph.D., Associate Professor, Indigenous Research Methodology: NAS 513.

• Paul T. Arbetan parbetan@dinecollege.edu Ph.D., Associate Professor, General Biology II, Ecology, Evolutionary Biology: BIO 182, BIO 326, BIO 435.
• Michael P. Begaye mbegaye@dinecollege.edu Ph.D., Professor, General Chemistry II, Fundamental Organic Chemistry, General Organic Chemistry I, Fundamental Biochemistry: CHM 152, CHM 300, CHM 301, CHM 360.
• Scott Bender sbender@dinecollege.edu Ph.D., Professor, Vertebrate Zoology, Animal Physiology: BIO 370, BIO 425.
• Frederick T. Boyd fboyd@dinecollege.edu Ph.D., Associate Professor, Human Anatomy and Physiology I and II, General Genetics, Cellular and Molecular Biology, Undergraduate Research: BIO 201, BIO 202, BIO 340, BIO 344, BIO 498.
• Imelda M. Cayabyab icayabyab@dinecollege.edu M.S., Adjunct Faculty, Pre-Calculus: MTH 190.
• Joseph A. De Soto jdesoto@dinecollege.edu Ph.D., Professor, Human Anatomy and Physiology I and II, Microbiology, Human Pathophysiology: BIO 201, BIO 202, BIO 205, BIO 320.
• Michael Roy Ferrer mferrer@dinecollege.edu M.S., Dual Credit Instructor, Statistics: MTH 213.
• Henry H. Fowler hfowler@dinecollege.edu M.S., Adjunct Faculty, Statistics: MTH 213, PSY 213.
• Marilou A. Joson mjoson@dinecollege.edu M.S., Dual Credit Instructor, Pre-Calculus: MTH 190.
• Barbara A. Klein bklein@dinecollege.edu M.S., Faculty, Fundamental Organic Chemistry, General Organic Chemistry I and II, Microbiology, General Genetics: CHM 300, CHM 301, CHM 302, BIO 205, BIO 340.
• Oleksandr Makeyev omakeyev@dinecollege.edu Ph.D., Associate Professor, Statistics, Design of Experiments and Analysis of Data: MTH 213, BIO 501.
• John M. Murray jmurray@dinecollege.edu Ph.D., Associate Professor, Plants and Climate: BIO 426.
• Babatunde Ojo bojo@dinecollege.edu Ph.D., Professor, General Chemistry II, Fundamental Organic Chemistry, General Organic Chemistry I and II: CHM 152, CHM 300, CHM 301, CHM 302.
• Paul Stephen Prueitt pprueitt@dinecollege.edu Ph.D., Associate Professor, Pre-Calculus, Calculus I, Statistics: MTH 190, MTH 191, MTH 213.
• Donald K. Robinson dkrobinson@dinecollege.edu Ph.D., Associate Professor, Human Anatomy and Physiology I and II, Human Pathophysiology, Animal Physiology, Writing in the Biological Sciences, Undergraduate Research, Contemporary Developments in Biology, Elements of Scientific Endeavor, Lab Seminar: BIO 201, BIO 202, BIO 320, BIO 425, BIO 365, BIO 498, BIO 499, BIO 503, BIO 698.
• Suzanne L. Russ sruss@dinecollege.edu Ph.D., Associate Professor, Statistics: PSY 213.
• Partha S. Saha psaha@dinecollege.edu Ph.D., Faculty-Assistant Professor, Microbiology, General Genetics: BIO 205, BIO 340.
• Demetra N. Skaltsas dskaltsas@dinecollege.edu Ph.D., Assistant Professor, Plant Biology, Mushrooms and Molds, Lab Seminar, Thesis Research: BIO 284, AGR 323, BIO 698, BIO 699.
• Shazia Tabassum stabassum@dinecollege.edu Ph.D., Professor, Human Anatomy and Physiology I and II, General Biology II, Microbiology, Human Pathophysiology, General Genetics, Cellular and Molecular Biology, Undergraduate Research, Lab Seminar, Thesis Research: BIO 201, BIO 202, BIO 182, BIO 205, BIO 320, BIO 340, BIO 344, BIO 498, BIO 698, BIO 699.
• Imelda Torres itorres@dinecollege.edu M.S., Dual Credit Instructor, Pre-Calculus: MTH 190.
• Rajneesh Verma rverma@dinecollege.edu Ph.D., Assistant Professor, General Chemistry II, Fundamental Organic Chemistry, Fundamental Biochemistry: CHM 152, CHM 300, CHM 360.
• Chengde Wang cwang@dinecollege.edu Ph.D., Associate Professor, Pre-Calculus, Calculus I: MTH 190, MTH 191.
• Kevin Webster kwebster@dinecollege.edu Ph.D., Assistant Professor, Developmental Biology, Writing in the Biological Sciences, Comparative Invertebrate Zoology: BIO 351, BIO 365, BIO 385.
• Taiping Ye tye@dinecollege.edu Ph.D., Assistant Professor, Statistics: MTH 213.
Note: Faculty's graduate institutions can be found in the College Catalog

Table 6. D.1. Faculty Profile over a three-year period. Ranking began in 2020.

	2020-21	2021-22	2022-23	2023-24
Total Program Faculty/Instructors	**12**	**12**	**11**	**13**
Full-Time Faculty				
Education (PhD, MA, BA)				
Rank				
Adjunct Faculty				
Education (PhD, MA, BA)				
Rank				
Gender (Female/Male)	3/9	3/9	3/8	4/9
Race/Ethnic (Native/Non-Native)				
Salary Range				

Table 7. D.2. Student/Faculty Ratio

	2020-21	2021-22	2022-23	2023-24
Average Student to Faculty Ratio	7:1	11:1	13:1	14:1

D.4. Full-time Faculty Management

How are full-time faculty mentored and supported?

- In the post-pandemic period, there has been a notable shift from online back to in-person teaching. As a result, all teaching staff are now mandated to be present on site. However, the requirement for Quality Matters certification remains in place for those involved in online instruction. Faculty are also being adequately trained in essential soft skills through various workshops and professional development programs, both on-site and off-site. For example, recent training included sessions on the Canvas Learning Management System.

How is teaching performance of full-time faculty reviewed and how does the school respond to problems that are identified?

- Each semester students are asked to complete evaluations of classes.
- The Dean of the school of STEM conducts annual employee reviews.
    - Problems identified are taken care of by the Dean, Provost and HR, using the 3P Manual guidelines.
- Faculty and staff who attend trainings, conferences, or any type of professional development must complete employee development supplement questionnaire before training takes place. The EDSQ is filed in HR and used to highlight faculty and staff achievement.
- Trip report forms are completed at the conclusion of a trip. To complete the form, the travel participant must list at least two contacts or partnerships made with other attendees.

D.5. Part-time Faculty Contribution and Evaluation

How do the part-time faculty members contribute to the program? How are the part-time faculty evaluated?

- Each semester students are asked to complete evaluations of classes.

E. Data Analysis

E.1 Characteristics of Students

E.1. Student demographics over four-year period.

Table 8: Overview of Student Profile

	2020-21	2021-22	2022-23	2023-24
Full-Time & Part-Time Students – unduplicated, includes fall, spring and summer terms	67	57	45	47
First Time First Year Enrollees	4	1	0	1
Transfer Students	0	0	1	3
Pell Grant Recipient – at least one term	45	41	32	33
Gender = F/M	53/14	43/14	35/10	37/10
Race/Ethnic = Native/Non-Native	64/3	55/2	44/1	46/1
Age Range:				
13-17	0	0	0	0
18-21	8	3	3	3
22-24	14	15	12	12
25-34	24	22	17	16
35-49	17	13	9	12
50 & Older	4	4	4	4

E.2 Graduates, Alumni, Graduation Rate

E.2. Table 9: Student by Chapter affiliation – Top 5 over a 4-year period

Chapter	Total # of students enrolled
Chinle	13
Tuba City	11
NULL – student did not disclose/no data in J1	9
Fort Defiance	9
Tsaile/Wheatfields	8

F. Student Engagement and Learning Opportunities

F.1. Community Engagement

- Are there any community engagement activities between high schools, business communities, and community organizations with the department? How does the College support such community engagement activities for the students in this

program?

Diné College and the Board of Regents collaborated with the Navajo Nation Council to establish the Diné Environmental Institute Research and Outreach with funding from the Navajo Nation Council (Resolution # CAP -21-01) and the Navajo Nation Council Education Committee (Resolution ECMA – 36-00). DEI has stayed true to Diné College's mission of making a positive impact on students.

Diné College's STEM department demonstrates strong community engagement through structured collaborations with high schools, tribal organizations, and regional institutions. A key initiative is the CONVOY project, funded by the NIH (2023–2028), which integrates Diné traditional knowledge with biomedical science and promotes STEM learning through a culturally grounded mentorship model. College students mentor junior high and high school students, facilitating hands-on laboratory activities, science cafés, and public health fairs while offering dual-credit opportunities through Navajo culture-based coursework [1]. Additionally, the Navajo Native American Research Center for Health (NARCH), a partnership with Northern Arizona University, engages high school students and undergraduates in health sciences education and research, addressing health disparities within the Navajo Nation. NARCH enhances the STEM pipeline by exposing students early to biomedical career pathways and by embedding community-based research within academic curricula [2]. Furthermore, Diné College's Land Grant Office supports agriculture and environmental science outreach by hosting youth-focused events such as environmental camps, school gardening projects, and livestock workshops, providing students with applied learning experiences that reinforce STEM concepts in community contexts [3,4]. These initiatives are institutionally supported through faculty-led programs, federal grants, and dedicated outreach offices, ensuring that students gain research, teaching, and service experience while contributing to the well-being of Navajo communities [5].

References:

1. Diné College. Diné College launches CONVOY project to blend traditional and Western medicines [Internet]. 2023 [cited 2025 Apr 11]. Available from: https://www.dinecollege.edu/dine-college-launches-convoy-project-to-blend-traditional-and-western-medicines/

2. Northern Arizona University. Navajo NARCH Partnership [Internet]. 2023 [cited 2025 Apr 11]. Available from: https://nau.edu/center-community-health-engaged-research/navajo-native-american-research-center-for-health-partnership/

3. Diné College. Land Grant Office [Internet]. 2023 [cited 2025 Apr 11]. Available from: https://www.dinecollege.edu/about-us/land-grant-office/

4. Diné College Newsroom. Land Grant Office hosts environmental youth camp [Internet]. 2022 [cited 2025 Apr 11]. Available from: https://www.dinecollege.edu/land-grant-office-hosts-environmental-youth-camp/

5. Diné College. Strategic Plan 2023–2028 [Internet]. 2023 [cited 2025 Apr 11]. Available from: https://www.dinecollege.edu/wp-content/uploads/2023/09/Strategic-Plan-2023-2028.pdf

F.2. High Impact Practices

- Identify the high impact practices that are incorporated into this program and its courses. High Impact practices refer to teaching and learning practices that have been shown to be beneficial for college students for student engagement and retention. High Impact practices may include experiences such as First Year Seminars, Writing Intensive Courses, Undergraduate Research, e-portfolios, Emphasis on Diversity/Global Learning, Service Learning, Community-Based Learning, Internships, Capstone Courses and Projects.

High impact practices like writing intensive courses and seminars are incorporated in this program. Effective communication and knowledge of primary scientific literature are two of the most critical abilities that we can teach in an undergraduate biology curriculum. Keeping this goal in mind, *BIO 365 Writing in Biology* is designed and offered in junior semester (I) of BS in Biology Degree. The course benefits are threefold:
1) Enhance students' capacity to comprehend main scientific articles,
2) Improve students' ability to communicate science to scientists, and
3) Improve students' ability to convey science to laypeople
The structure of the course revolves around how to write a Research Review Paper, engaging the student in a subject area of research that he or she is most interested in.

BIO 498 Senior Seminar (1-2 credits), based on topics in Biology, is also offered in the senior year. The appeal of seminars as a programmatic and curricular strategy stems from the fact that a credit-bearing course provides a traditional and acceptable structure for extending orientation activities. They also give a rational structure for encouraging (and intrusively requiring) active student involvement in learning and in the institution's life and activities; analyzing and discussing student/institutional fit; and enabling social and academic integration [4].

BIO 499, Contemporary Developments (3 credits), is another synthesis course that exposes senior biology students to the most recent and meaningful scientific advances on the Navajo Nation, regionally, nationally, and globally. The course is co-taught by most of the biology faculty and several external collaborating researchers, and includes topics such as COVID-19 and tribal communities, pressing Navajo Nation public health issues, pollution on the Navajo Nation, Navajo Nation environmental issues, Navajo Nation Fish and Wildlife research projects, Southwestern oil and gas exploration and consequences, Navajo and other traditional medical systems, climate change.

Academic year and summer student research internships are available and popular for students, as mentioned in the section above. Students receive credit for their Undergraduate Research through BIO 485, mentored by their lab faculty.

F.3. Library Services

- How well does the Library meet the needs of the program? Describe the adequacy of the Library's holdings (e.g.

databases, journals, books, and audiovisual materials). How do the collaborative information literacy instruction and reference/research assistance programs support the program being reviewed?

The library holds books, audiovisual materials, CINAHL Plus, Medline, Native health database and PubMed for extensive literature search for assignments and projects to supplement the learning in classroom. Several citations and research tools are available through college library website for students including Diné College Social and Behavioral Sciences Writing Handbook, Style Guide: APA and MLA , Easy Bib Citation Creator, Citation Machine, Citation Generator Free for MLA, APA, and Chicago, Purdue writing lab and Zotero, Zotero is a free, easy-to-use tool to help you collect, organize, cite, and share research.

F.4. Course Satisfaction

- How satisfied are students with courses being offered? Provide summarized course evaluations. How has the department responded to issues raised to course satisfaction concerns via quantitative and qualitative assessments?

This information is not publicly shared. Professors must request their course evaluations from OIPR – they do not automatically receive these annually. The Dean supervises faculty and is responsible for following up on student complaints with faculty and their courses. This information is not publicly available. Anecdotally, however, it is known by all faculty that our School of STEM, Dean James Tutt, follows up on student complaints and strives for improved teaching and learning by faculty and student alike.

G. Resources

G.1. Facilities

- Please describe the facilities that are used or associated with the degree program including but not limited to: number of classrooms, science labs, office space, faculty office space, and digital databases for academic use, computer labs, conference rooms, and other equipment.

Table 10. Facilities

	Tsaile	Shiprock	Tuba City
Number of classrooms,	3 science lab classrooms in GCB, 2 ITV rooms, many NHC and GCB general classrooms	1 Biology and 1 Chemistry classroom in new Math Science building	1 lab classroom 2 research trailers (can be used as classrooms too)

Science labs	3 research labs: Dr. Skaltsas endophyte lab; Dr. Shreeta, chemistry analytical lab; Dr. Makeyev, EEG lab; 3 lab classrooms; 2 prep rooms	3 labs (Biology, Chemistry, GIS)	2 research trailers: Dr. Hakim and Dr. Ojo
Office space	3 staff offices (1 TCUP staff, 2 administrative)	2 research staff offices	
Faculty office space	8 faculty offices	2 faculty offices	2 faculty offices
Computer labs	Several on campus for students	Several on campus for students	One on campus for students
Conference rooms	Use classrooms	Use classrooms	Use classrooms
Other equipment	Lab classrooms are fully outfitted to teach courses	Classrooms are fully outfitted to teach courses	Lab classrooms are fully outfitted to teach courses
Does School financially and physically maintain these?	Yes	Yes	Yes

G3. Operating Budget

- Provide a summary of the costs associated with the degree program. Indicate whether the cost to fund this program has increased over the years.
- This is not a financial audit, so in-depth descriptions of financial expenditures is not required. For example, indicate on average how much is spent annually on total faculty salaries, or operating costs, or co--- curricular activities. DO NOT PROVIDE A DETAILED EXPENDITURE LIST.

H Review

Provide a brief reflection of all areas of criteria and indicate areas of improvement.

No areas of improvement are indicated at this time. We look forward to group discussion during the APR, final recommendations, and the resulting 3-year Action Plan.

I Results of the Site Visit

Attach/include the Site Visit Day Agenda and the APR Evaluation Team Documents.

Tentative:

9:00 to 10:30 AS Biology APR
Break
10:45 to 12:15 BA Biology APR
Lunch
1:00 to 2:00 Tour of Biology Lab-Classrooms, Dr. Skaltsas' lab, Dr. Makeyev's lab, Dr. Hakim's lab
2:00 to 3:30 MS Biology APR

J External Reviewer – Feedback and Response

Provide details of the external reviewer's feedback. Please summarize the suggestions and recommendations put forth by the External Reviewer.

K Three-Year Action Plan

***I and J are NOT part of the self-study, but included in the APR Final Report.