

Overview

Associate of Arts in Pre-Engineering (Civil, Geological) and Science Engineering and Mathematics (SEM)

Organization: Oglala Lakota College

Instructional Level: Associate of Science

Instructional Area: Math, Physical and Biological Sciences

Program Managers: Charles Jason Tinant, James Sanovia, AJ Silva

Original Developers: Charles Jason Tinant, James Sanovia, AJ Silva, Deig Sandoval

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Revised by: Charles Jason Tinant, James Sanovia, AJ Silva

Mission and Purpose

The purpose of the Science Engineering and Mathematics (SEM) and pre-engineering associate degrees are to prepare students to transfer into accredited engineering and science baccalaureate programs. A comprehensive articulation agreement was accepted by the South Dakota Board of Regents (SDBOR) to transfer course credit from Oglala Lakota College (OLC) to ABET accredited science and engineering programs at South Dakota School of Mines and Technology (SDSMT) and South Dakota State University (SDSU).

The Math, Science, and Technology learning philosophy emphasizes a constructivist framework, a hands-on approach to improve the quality of life on the Reservation through science and technology.

Indirect measures: Transfer to a 4-year engineering or science program.

Career/Job titles: Engineering technician or science technician.

Entry Requirements: Math 103

Program Outcomes for Pre-Engineering - Civil

For the Pre-Engineering – Civil track students will demonstrate the following outcomes criteria:

- a. Apply laws of chemistry and stoichiometric rules to predict changes in temperature, volume and ionic compositional behavior. This outcome will be evaluated by a final exam in Chemistry II (Mastery), Chemistry I (Introduced), and lab notes from Chemistry I & II (Reinforced);
 - i. The student will demonstrate *superior* competency in meeting the program outcome if performance exceeds the normal expectations for the degree requirements as demonstrated by a score above 90%;
 - ii. The student will demonstrate *satisfactory* competency in meeting the program outcome if performance meets the normal expectations of the degree requirements as demonstrated by a score between 80% - 70%;
 - iii. The student will demonstrate *improvement needed* in meeting the program outcome if performance is overall sufficient and many fundamental requirements have been carried out in an adequate manner. However, some learning objectives have not been realized as demonstrated by a score between 70% - 60%;
 - iv. The student does not demonstrate competency in meeting the program outcome as demonstrated by a score below 60%.

- b. Demonstrate an understanding of Newtonian principals.
 - i. The student will demonstrate *superior* competency in meeting the program outcome if performance exceeds the normal expectations for the degree requirements as demonstrated by a score above 90%;
 - ii. The student will demonstrate *satisfactory* competency in meeting the program outcome if performance meets the normal expectations of the degree requirements as demonstrated by a score between 80% - 70%;
 - iii. The student will demonstrate *improvement needed* in meeting the program outcome if performance is overall sufficient and many fundamental requirements have been carried out in an adequate manner. However, some learning objectives have not been realized as demonstrated by a score between 70% - 60%;
 - iv. The student does not demonstrate competency in meeting the program outcome as demonstrated by a score below 60%.

- c. Apply the rules of trigonometry, differentiation and integration to quantify processes occurring in the natural world. This outcome will be evaluated by a comprehensive final exam in Calculus III (Mastery), Calculus II (Reinforced), Calculus I (Introduced), Trigonometry (Introduced);

- i. The student will demonstrate *superior* competency in meeting the program outcome if performance exceeds the normal expectations for the degree requirements as demonstrated by a score above 90%;
 - ii. The student will demonstrate *satisfactory* competency in meeting the program outcome if performance meets the normal expectations of the degree requirements as demonstrated by a score between 80% - 70%;
 - iii. The student will demonstrate *improvement needed* in meeting the program outcome if performance is overall sufficient and many fundamental requirements have been carried out in an adequate manner. However, some learning objectives have not been realized as demonstrated by a score between 70% - 60%;
 - iv. The student does not demonstrate competency in meeting the program outcome as demonstrated by a score below 60%.
- d. Evaluate how materials act under conditions of equilibrium. This outcome will be evaluated by a comprehensive final exam in Mechanics (Mastery), Statics (Reinforced), Physics I (Introduced);
 - i. The student will demonstrate *superior* competency in meeting the program outcome if performance exceeds the normal expectations for the degree requirements as demonstrated by a score above 90%;
 - ii. The student will demonstrate *satisfactory* competency in meeting the program outcome if performance meets the normal expectations of the degree requirements as demonstrated by a score between 80% - 70%;
 - iii. The student will demonstrate *improvement needed* in meeting the program outcome if performance is overall sufficient and many fundamental requirements have been carried out in an adequate manner. However, some learning objectives have not been realized as demonstrated by a score between 70% - 60%;
 - iv. The student does not demonstrate competency in meeting the program outcome as demonstrated by a score below 60%.
- e. Perform a survey and create a model with the survey results using appropriate calculations, equipment, and software. This outcome will be evaluated by a comprehensive final exam and semester project in Surveying (Mastery), Engineering Graphics (Reinforced), Trigonometry (Introduced);
 - i. The student will demonstrate *superior* competency in meeting the program outcome if performance exceeds the normal expectations for the degree requirements as demonstrated by a score above 90%;
 - ii. The student will demonstrate *satisfactory* competency in meeting the program outcome if performance meets the normal expectations of the degree requirements as demonstrated by a score between 80% - 70%;
 - iii. The student will demonstrate *improvement needed* in meeting the program outcome if performance is overall sufficient and many fundamental requirements have been carried out in an adequate

manner. However, some learning objectives have not been realized as demonstrated by a score between 70% - 60%;

iv. The student does not demonstrate competency in meeting the program outcome as demonstrated by a score below 60%.

f. Demonstrate the basic principles of environmental engineering including water chemistry, water and wastewater treatment, and the mass balance approach to system analysis. This outcome will be evaluated by a comprehensive final exam in Principals of Environmental Science and Engineering (Mastery),