Composite Science BS

Goal 1: Proficiency of Graduates

Goal Description:

Prepare students seeking Composite Science certification to become successful 7th-12th grade science teachers based upon their knowledge of both science and pedagogy

Providing Department: Composite Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

G1O1: Content Proficiency

Learning Objective Description:

Students in the Composite Science program will be proficient in the content areas of the degree pertaining to astronomy, biology, chemistry, geology/earth science, and physics. The standards established by the National Science Teachers Association (NSTA) can be found at https://www.nsta.org/preservice/ .The coursework which comprises the science curriculum component of the degree was specifically selected in order to prepare students to meet these standards.

RELATED ITEM LEVEL 2

G1O1I1: Representative Exam (proficiency) - Indicator

Indicator Description:

Students will take the Representative Exam available on the ETS website to assess their proficiency in both the Common Core component of the Composite Science degree and the advanced content in each discipline. This exam will be used to prepare students to take the TExES exam. The Representative exam will be taken the semester before the Methods Block.

Criterion Description:

80% of students taking the Representative exam will earn a score of 80% or higher.

Findings Description:

At this time, nine students attempted the Representative exam practice test during their Science Teaching Methods course (BIOL 3390, Fall 2021).

Six took the test twice. Three earned 80% or higher. Unfortunately, six earned lower than 80%. The scores are shown below.

Student	Pre Score	Post Score
Student 1	21.25%	
Student 2	20.90%	
Student 3	21.75%	90.00%
Student 4	17.30%	70.30%
Student 5	21.50%	94.00%
Student 6	23.00%	95.00%
Student 7	19.60%	74.00%
Student 8	17.75%	66.70%
Student 9	22.50%	

RELATED ITEM LEVEL 3

G101/1: Representative Exam (Proficiency)- Indicator

Action Description:

The results from the larger group indicate that there is a problem that needs to be addressed.

One possible source of the problem is that students may be taking the test before they have completed an adequate amount of their science coursework. This is only be a small subset taking courses concurrently, now that they cannot take the Science Methods (BIOL 3390) course without completing all of their science coursework (pre-requisites).

Another possibility is that the students may not be preparing for the exam given that it's a practice exam. Perhaps they simply want to get a sense of the nature of the exam in order to prepare for the TExES exam. If so, they may not be worried about their scores and are not motivated to do their best.

Lastly, there may be a gap in the curriculum and/or content teaching that needs to be addressed. The domain students struggled with were physics and chemistry. In light of these possibilities, an effort will be made to contact the students and ask for information on this issue.

RELATED ITEM LEVEL 2

G1O1I2: TExES Exam (proficiency) - Indicator

Indicator Description:

Students will take the TExES exam.

Criterion Description:

80% of students taking the TExES exam will pass on their first attempt with a score of 80% or higher (minimum of 240 points). Those who do not pass on their first attempt will pass it on their second attempt. Students will take the TExES exam during their Methods Block. *Although students do not have to pass the test before doing their Student Teaching Block, they must pass the exam to receive certification. In addition, from the standpoint of program accountability, students must pass the test by their second attempt, though they can take it as many as five times.

Findings Description:

Seven students took the TExES Composite (7-12) Science Exam. Four passed the exam. Two failed. All attempts were first attempts.

Student	Exam Date	Pass/Fail	Total Scaled Score
Student 1	2021-05-12	P	249
Student 2	2021-03-04	P	269
Student 3	2021-11-08	P	272
Student 4	2022-04-27	F	227
Student 5	2022-04-20	F	224
Student 6	2021-12-15	P	243

RELATED ITEM LEVEL 3

G101I2: TExES Exam (proficiency)- Indicator

Action Description:

Students showed significant improvement between their practice exams to the actual TEA TExES Composite Science exams.

While two individuals did not meet the criteria, they were close.

Upon closer examination, the most students struggled with the physics and chemistry domains. This makes sense, as the majority of the CompSci majors chose an emphasis in biological sciences.

While we work with students to create study plans and offer tutoring, we need to also include some additional resources. The Education Department has asked us to create digital study guides for students to use within the campus LMS. We will work on this over the summer and begin with Domains 2 & 3 (Physics & Chemistry).

Future indicators may include the analysis of domain specific competencies.

RELATED ITEM LEVEL 2

G1O1I3: Science Methods Assignments (proficiency) - Indicator

Indicator Description:

Students will complete designated assignments which address critical thinking and scientific reasoning. These assignments are:

1. *a) NSTA research assignment, or similar assignment (completed in the Science Teaching Methods course)*
2. *b) The Texas Education Agency (TEA) Science Safety Training for High School certification course and exam (completed in the Science Methods course).*
   This course is a self-paced foundational training module for science safety at the high school level. The course provides a review safety policies, procedures, and responsibilities that pertain to instructional settings. Below is a link to the site which provides information about this course/certification.

   (https://www.texasgateway.org/resource-index/science%2520safety%2520training.)

Criterion Description:

Students will score 80% or higher on the NSTA/research assignment and all students will pass the safety certification course.

Findings Description:

The Science Methods course (BIOL 3390) was offered fall of 2021. The TEA Safety module was offline during the course, so we adjusted and used the Flinn Scientific Safety module (used by many ISDs) and an in-class extension Safety Assignment.

Nine Composite Science students were enrolled and all successfully completed the assignments. All students, but one, successfully met the criterion for the NSTA research assignment. All students met the criterion for the safety assignments. The results are shown below:

Students	Research Assignment	Flinn Safety	Safety Assignment
Student 1	100%	100%	100%
Student 2	57%	100%	100%
Student 3	100%	100%	100%
Student 4	100%	100%	100%
Student 5	100%	100%	100%
Student 6	100%	100%	100%
Student 7	100%	100%	100%

Student 8	100%	100%	100%
Student 9	100%	100%	80%

RELATED ITEM LEVEL 3

G101/3: Science Methods Assignments (proficiency)- Indicator

Action Description:

Students are successfully completing this indicator. Students do not appear to be missing any domain specific content tied to this indicator on their practice exam or TExES exams.

While these items must be documented for the program and for TEA, we may need to find a more granular level of data to investigate OR omit this indicator from the assessment plan for an area needing improvement/growth.

RELATED ITEM LEVEL 1

G1O2: Proficiency in Critical Thinking and Scientific Reasoning

Learning Objective Description:

Students in the Composite Science program will demonstrate proficiency in critical thinking and scientific reasoning.

RELATED ITEM LEVEL 2

G1O2I1 CAT Assessment (proficiency) - Indicator

Indicator Description:

Students will take the Critical Thinking Assessment Test (CAT) developed by Tennessee Tech University as part of their Foundations of Science course (BIOL 1436). The test will be taken again in the Science Methods course near the end of the course. This approach will indicate whether students demonstrate gains in critical thinking/scientific reasoning in the Foundations of Science course, and additional gains during the period between the time in which the students took the Foundations of Science course and the Science Methods course.

Criterion Description:

Students will show improvement between the pre-test and post-test taken in the Foundations of Science course; and, they will maintain or improve their score in the Science Methods course (relative to the post-test in the Foundations of Science course).

Findings Description:

Students missed taking the CAT during the Foundations of Science (lower division course), as this would have occurred during the pandemic. It will take one more semester before we see students that have taken the CAT earlier in their career (for later "upper division" comparison, Science Methods scores).

Eight students did, however, take the CAT during BIOL 3390. Results can be found in Table 1.

Table 1. Composite Science CAT Scores

Student	CAT Pre-Test	CAT Post-Test	Sci Methods CAT Test
Student 1	na	na	45%
Student 2	na	na	56%
Student 3	na	na	36%
Student 4	na	na	43%
Student 5	na	na	38%
Student 6	na	na	31%
Student 7	na	na	38%
Student 8	na	na	31%
Student 9	na	na	na

“na” = not available/not taken for the reasons cited above

The average CAT score (39.75%) may appear low, however, it is comparable to those recorded by the Office of Academic Planning and Assessment as part of a university-wide attempt to assess the critical thinking skills of SHSU students. In 2016-2017, 537 SHSU upper-level students took the CAT exam and the average score was 33.3%. For the year 2017-2018, 513 students took the exam and the average score was 38.3%. https://www.shsu.edu/dept/academic-planning-and-assessment/assessment/results.html

RELATED ITEM LEVEL 3

G1O2I1 CAT Assessment (proficiency) - Indicator

Action Description:

Students have continually met, or exceeded, proficiency levels on this indicator. This assessment, however, is the most difficult to proctor. Any natural disaster or pandemic inhibits our ability to assess and report on this indicator. Future assessments will need to be virtual/remote and proctored online.

For this indicator to more meaningful (rather than simply, "they meet proficiency"), we may need to report more granular data and comparisons with representative cohorts or colleagues.

RELATED ITEM LEVEL 2

G1O2I2: Science Methods Assignments (proficiency) - Indicator

Indicator Description:

Students will complete designated assignments which address critical thinking and scientific reasoning.

These assignments are:

a) NSTA research assignment, or similar assignment (completed in the Science Methods course)

b) Science Safety Training Certification exam for High School (completed in the Science Methods course). This course/certification is offered free of charge through the Texas Education Agency Gateway resource.

Criterion Description:

Crit. 1. 80% of students who complete the research assignment will score 80% or higher.

Crit. 2. All students will pass the safety certification exam

Findings Description:

The Science Methods course (BIOL 3390) was offered fall of 2021. The TEA Safety module was offline during the course, so we adjusted and used the Flinn Scientific Safety module (used by many ISDs) and an in-class extension Safety Assignment.

Nine Composite Science students were enrolled and all successfully completed the assignments. All students, but one, successfully met the criterion for the research assignment. All students met the criterion for the safety assignments. The results are shown below:

Students	Research Assignment	Flinn Safety	Safety Assignment
Student 1	100%	100%	100%
Student 2	57%	100%	100%
Student 3	100%	100%	100%
Student 4	100%	100%	100%
Student 5	100%	100%	100%
Student 6	100%	100%	100%
Student 7	100%	100%	100%
Student 8	100%	100%	100%
Student 9	100%	100%	80%

RELATED ITEM LEVEL 3

G1O2I2: Science Methods Assignments (Proficiency) - Indicator

Action Description:

Students met the suggested proficiency level.

This indicator is redundant and should be omitted for future assessment plans.

RELATED ITEM LEVEL 1

G1O3: Proficiency in Meeting Science Standards Established by the Texas Education Agency

Learning Objective Description:

Students in the Composite Science program will demonstrate pedagogical proficiency as defined by TEA standards These standards can be found at

file:///C:/Users/geo_bmg/AppData/Local/Microsoft/Windows/INetCache/IE/J6O6J70I/DRAFT_TX_Science7-12(2).pdf

RELATED ITEM LEVEL 2

G1O3I1: Pedagogical Standards (proficiency) - Indicators

Indicator Description:

Assessments from appropriate coursework pertaining to teacher certification requirements in the College of Education will be used to assess pedagogical proficiency.These assessments include:

a) Unit Plans

b) Focused Content Observations (FCOs)

c) Student Portfolios

Criterion Description:

a) 80% of the Unit Plans must be rated as satisfactory or better by the evaluator

b) 80% of the FCOs must be rated as satisfactory by the evaluator.*Both College of Education and College of Science and Engineering Technology faculty members may participate in the FCOs.

c) 80% of the Student Portfolios must be rated as satisfactory by the evaluators.

Findings Description:

a) All nine students completed the Unit Plans with 80% or higher (in BIOL 3390, Fall 2021). This assignment was peer and instructor evaluated for revisions, until all students earned 100%.

b) Eight students completed the Facilitated Content Observation. One students did not present their lesson for observation. The eight observations were rated satisfactory by the evaluator (in BIOL 3390, Fall 2021).

c)Student Portfolios were discontinued by the Education department. We will have to seek an alternative or omit this component.

RELATED ITEM LEVEL 3

G1O3I1: Pedagogical Standards (proficiency) - Indicators

Action Description:

Students meet this standard regularly. These standards are cross listed between departments and present in other indicators.

This standard is redundant and may need to be omitted from future assessment plans.

RELATED ITEM LEVEL 1

G1O4: Proficiency in Pedagogical Techniques

Learning Objective Description:

Students in the Composite Science program will demonstrate proficiency in pedagogical techniques used in science courses.

RELATED ITEM LEVEL 2

G1O4I1: Pedagogies for Teaching Science Content (proficiency) - Indicator

Indicator Description:

Scores on designated assignments (lesson plans) in the Science Methods course will be used to assess students' proficiency pertaining to pedagogical approaches used to teach science.

Criterion Description:

80% of students who complete the required assignments will earn a score of 80% or higher.

Findings Description:

Nine students were assigned the required assignment (lesson plans). One student failed to complete these items. All eight that did complete the assignments earned 80% or higher. See below:

The assignments entailed the creation of a plan (on the content specific domains the student tested lowest on), teaching the plan, and a subsequent reflection on the experience.

Student	Lesson Plan	Teaching Observation	Reflection
Student 1	100%	91.0%	100%
Student 2	100%	89.0%	100%
Student 3	100%	85.0%	100%
Student 4	100%	87.5%	100%
Student 5	100%	84.0%	100%
Student 6	100%	87.0%	100%
Student 7	100%	93.0%	100%
Student 8	0%	0%	0%

RELATED ITEM LEVEL 3

G1O4I1: Pedagogies for Teaching Science Content (proficiency) - Indicator

Action Description:

Based on the positive results obtained for this indicator, the course instructors will continue to use the approach described and make adjustments to refine the process. These items are required for TEA and departmental reporting, however, students appear to be easily meeting and exceeding the proficiency standard.

As with some of the other indicators, we may need to report more granular data to make this useful for future assessment plans. We could, for instance, take a look at how many edits students make before reaching the final score and/or looking at why they lost points for their presentations.

Goal 2: Mentoring and Support

Goal Description:

Provide appropriate mentoring and advising support for students seeking Composite Science Certification.

Providing Department: Composite Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

G2O1: Tracking System for Mentoring and Support

Learning Objective Description:

The Composite Science program administrator (currently the Associate Dean in the College of Science and Engineering Technology) and advisors for the Composite Science program will establish a system for tracking students in the program for purposes of ensuring that the students are taking the required assessments at the required time.

RELATED ITEM LEVEL 2

G2O1I1: Database Tracking Systems - Indicator

Indicator Description:

A Composite Science database will be maintained as part of the TK-20 system and as part of the Program Coordinator's data base which will include the names of all students in the Composite Science program, their year in their program, a list of all assessments required of the students, their scores on these assessments, and notes comments/feedback provide by supervising instructors.

The following student information will be entered:

a) Name

b) SHSU GPAs in major and minor, and cumulative GPA

c) Date of admission to the SED program

d) Content area of emphasis (Biology, Chemistry, Earth Science, Physics)

The following are the assessment scores that will be entered:

a) Three Cat scores (taken in the FOS course as a pre-and post-test and in the Science methods course

b) NSTA research assignment, or similar assignment (completed in the Science Methods course)

c) TEA Science Safety Certification exam (completed in the Science Methods course)

d) Science teaching pedagogy assignments (completed in the Science Methods course)

e) Representative exam score/s (taken prior to the Methods Block; i.e., normally during the same semester as the Science Methods course is taken)

f) TExES exam score/s (taken during the Methods Block)

g) Unit Plans (completed during the Methods Block and Teaching Block)

h) Focused Content Observations (made during the Teaching Block)

i) Student Portfolios (submitted during the Teaching Block)

Criterion Description:

The TK-20 database and Program Coordinator's database are in place and student information is added upon receipt of Declaration of Major information and information regarding grades on assessments. Meetings among advisors will be held as needed to determine whether modifications are needed to the TK-20 database.

Findings Description:

Meetings have occurred throughout the past year.

We have had some changes to personnel and advising, so updates will be required for next semester.

Additionally, the portfolio does not appear to be a component anymore, so will either need to be replaced or omitted from this evaluation.

RELATED ITEM LEVEL 3

G2O1I1: Database Tracking Systems - Indicator

Action Description:

The majority, if not all, of the indicators are now documented in our LMS.

We may audit this one last time before, ultimately, omitting this indicator from the plan. I would like to shift from documentation to recruitment efforts.

RELATED ITEM LEVEL 1

G2O2: Student Support and Mentoring

Learning Objective Description:

The Composite Science program administrator and advisors for the Composite Science program will use the TK-20 database to track the academic progress of the students for purposes of identifying students who may be struggling and for providing appropriate advising and mentoring.

RELATED ITEM LEVEL 2

G2O2I1: Student Support and Mentoring - Indicator

Indicator Description:

Using the TK-20 database and that of the Program Coordinator, those students who appear to be struggling with their coursework will be contacted by either the Composite Science program administrator or the advisor/s for the discipline-specific area in which the student is struggling. Scores on the Representative Exam and TExES exam are sent to the Program Advisor and the faculty advisors by the Teacher Education Certification Officer. In addition, the database is checked by the Composite Science administrator at the end of each semester, and the program administrator and/or the relevant advisor/s contact the student to set up a meeting between them. Notes will be entered into the Degree Works database following the meetings.

Criterion Description:

Students will be contacted if their Representative and/or TExES exam scores are less than 80% and m*entoring will be required in such cases.*

Findings Description:

The students that did not pass the TExES practice exam were contacted and directed to a faculty member for assistance in preparing for the TExES exams.

The two students that did not pass their TExES Composite (7-12) Science exam were contacted and directed to a faculty member for assistance in preparing for the TExES exams.

RELATED ITEM LEVEL 3

G202I1: Student Support and Mentoring - Indicator

Action Description:

Scores have improved dramatically in the past few years, largely due to the changes TLAC made in requiring the practice exam and approval by advisors/faculty from the double degree department.

Greater emphasis, however, needs to be paid to the competencies within each domain, for greater efficiency when studying.

Goal 3: Retention

Goal Description:

Maintain a high level of retention in the program.

Providing Department: Composite Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

G3O1: Advisor Support for Retention

Learning Objective Description:

Use the Composite Science advising and mentoring program to encourage students to continue in the program by providing support for all students in the program, and especially those who may be struggling.

RELATED ITEM LEVEL 2

G3O1I1: Information Updates (retention) - Indicator

Indicator Description:

Students will be sent information updates regarding the program as they progress through it.

Criterion Description:

All students in the database will receive these e-mails as needed.

Findings Description:

Students in the Composite Science program have been sent updates about the program, including adjustments to advising.

RELATED ITEM LEVEL 3

G3O1I1: Information Updates (retention) - Indicator

Action Description:

While this is being done, there are some miscommunications between the areas. There has also been quite a bit of personnel and organizational change these past few years.

Now that I have been in this role for a year, I now feel I know the various areas with which to communicate.

We will likely need to be more specific in what communication entails, methods, and timing.

Goal 4: Program Improvement

Goal Description:

Establish a system for obtaining feedback which can be used to improve the program.

Providing Department: Composite Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

G4O1: Student Perceptions for Program Improvement

Learning Objective Description:

Obtain information regarding student experiences and perceptions of the program.

RELATED ITEM LEVEL 2

G4O1I1: Senior Surveys (program improvement) - Indicators

Indicator Description:

Seniors, or recent graduates, will be surveyed using the Services and Operations instrument (attached) to obtain information about their experiences which can be used to improve the program. This survey is given during the Student Teaching Block.

Attached Files

Services and Operations Teacher Candidate Exit Survey.pdf

Criterion Description:

90% of the seniors who complete the survey will indicate that they were satisfied with the program.

Findings Description:

The surveys have not been administered

RELATED ITEM LEVEL 3

G4O1I1: Senior Surveys (program improvement) - Indicators

Action Description:

I failed to do this, this past year.

I simply need to conduct the surveys and report on them.

Update to Previous Cycle's Plan for Continuous Improvement Item

Previous Cycle's Plan For Continuous Improvement (Do Not Modify):

Closing Summary

As the coordinator for this double major, I feel it wise to keep the indicators the same for one cycle - given we were unable to gather data or accomplish former goals due to the pandemic. I will also need time to learn the ropes.

My hopes, for the future, are to streamline this assessment in future iterations, include a diversity/equity/inclusion focus, align assessment with university goals (i.e. strategic plan), and improve recruitment.

Update of Progress to the Previous Cycle's PCI:

I am glad we kept the indicators the same for one additional cycle. I now have a better idea for which indicators are redundant (and can be omitted), which need greater granularity, and which simply need greater focus.

I would like to replace some of the consistently proficient indicators focused on documentation with indicators tied to recruitment.

New Plan for Continuous Improvement Item

Closing Summary:

In the 2022-2023 academic year, efforts will be made to improve the ability to monitor student progress, especially as regards grades on the TExES practice exam. As discussed, this was not documented with the granularity desired. The goal is to ensure that students develop plan of study to remediate any deficiencies, to ultimately receive the tutoring necessary to do well on the actual TExES exam.

Greater effort will need to be made to ensure that all (or most) of the Composite Science students who take the CAT exams when they are in the FOS course. Greater effort will be made to report detailed results, rather than just pass/fail.

There is some redundancy in the KPIs for this program. We will need to maintain the items required by TEA, but with greater detail and nuance. Some items will likely be eliminated in lieu of indicators tied to recruitment and retainment.