Sam Houston State University
Office of Assessment

2021-2022

College of Science and Engineering Technology

School of Agricultural Sciences

Agriculture MS

Goal 1-Professional Communication Skills

Goal Description:

Graduate students will be able to communicate scientific data in a professional manner.

Providing Department: Agriculture MS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 1- Objective 1: Oral Communication Skills

Learning Objective Description:

Students will demonstrate professional oral communication and presentation skills that are relevant to scientific data.

RELATED ITEM LEVEL 2

Goal 1- Objective 1. Indicator 1: Three Minute Thesis Presentations in AGRI 6140

Indicator Description:

All students seeking the MS Degree in Agriculture will be required to complete AGRI 6140, a course that helps students develop essential skills for oral and electronic presentation of scientific research. Students will develop 3MT presentations based on either their research or that of their faculty advisor, and deliver these presentations to a team of two faculty members. Presentations will be evaluated using a faculty-developed rubric that scores presentations on a scale of one to five, in several different areas.

Attached Files

3MT Rubric.docx

Criterion Description:

Faculty expect that at least 70% of the students will perform at an acceptable level (3 out 5) or greater on all areas of their 3MT presentations.

Findings Description:

Regarding the 3MT presentations, 100% of students were able to score at an acceptable level (3 out of 5) or greater in all areas of presentation. In general, the weakest area measured was clarity, which would be a focus for the future.

RELATED ITEM LEVEL 3

Goal 1- Objective 1. Indicator 1: Three Minute Thesis Presentations in AGRI 6140

Action Description:

Findings show that all students successfully were able to get at least a 3 out of 4 on the Twelve Minute Presentation. As with the Three Minute Thesis, the instructor intends to expand the presentation to areas outside research. As such it is suggested results be reevaluated at the end of the next evaluation cycle.

RELATED ITEM LEVEL 2

Goal 1- Objective 1. Indicator 2: Twelve Minute Presentations in AGRI 6140

Indicator Description:

All students seeking the MS Degree in Agriculture will be required to complete AGRI 6140, a course that helps students develop essential skills for oral and electronic presentation of scientific research. Students will develop 12-minute presentations based on either their research or that of their faculty advisor, and deliver these presentations to a team of two faculty members. Presentations will be evaluated using a faculty-developed rubric that scores presentations on a scale of one to four, in several different areas.

Attached Files

12 min Rubric.docx

Criterion Description:

Faculty expect that at least 80% of the students will perform at an acceptable level (3 or 4 out of 4) on all areas of their twelve minute presentations.

Findings Description:

In the 12 min presentation, 100% of students were able to get a 3 or better in all areas. The area of completeness was the weakest area and a focal point for the future.

RELATED ITEM LEVEL 3

Goal 1- Objective 1. Indicator 2: Twelve Minute Presentations in AGRI 6140

Action Description:

Faculty expected that at least 80% of the students will perform at an acceptable level (3 or 4 out of 4) on all areas of their twelve minute presentations. However ,a redesign of this assignment may alter these results. As such, faculty expect that at least 80% of the students will perform at above an acceptable level (3 out of 4) or greater on all areas of their 3MT presentations in the future with the redesign.

Goal 2- Advanced Agricultural Science Knowledge and Skills

Goal Description:

Graduate students will demonstrate knowledge and skills relevant to advanced agricultural science.

Providing Department: Agriculture MS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 2- Objective 1: Global Perspective of Agriculture

Learning Objective Description:

Students, through the Master of Science Curriculum, will demonstrate a global perspective of agriculture while also gaining scientific and technical knowledge with research and analytical skills in agriculture and related sciences.

RELATED ITEM LEVEL 2

Goal 2- Objective 1. Indicator 1: Comprehensive Exam Common Question

Indicator Description:

Completion of the master of science curriculum requires that students successfully complete an oral (thesis) or written (non-thesis) exam. Exams are evaluated by a committee of faculty members with expertise in the student's subject area. Going forward, one consistent question will be used during all examinations, and faculty members will be asked to evaluate student responses to this question. A faculty-developed scoring mechanism will rate depth of knowledge, theoretical concepts, soundness of argument, critical thinking, and originality/insight on a scale of 0 (fail) to 3 (exceptional).

Criterion Description:

Faculty expect 100% of graduate students will receive at least a 2 out 3 on all areas of the rubric, indicating mastery of technical knowledge in their specific field of agriculture.

Attached Files

Rubric for COMP Question.xlsx

Findings Description:

This year, 87.5% of graduate students were able to receive at least a 2 out 3 on all areas of the rubric. Again the areas of "Concepts and Theory" and "Originality" , have some variation indicating these areas need to be closely watched in the future.

RELATED ITEM LEVEL 3

Goal 2- Objective 1. Indicator 1: Comprehensive Exam Common Question

Action Description:

Findings show that while students performed well, not all students have reached the anticipated expectations. As a result, it is suggested that instruction be refocused in the deficient areas for the next academic year and this objective be reevaluated once we have 25 observations.

RELATED ITEM LEVEL 1

Goal 2- Objective 2: Analytical Skills

Learning Objective Description:

Students completing the Master of Science Curriculum will exhibit research and analytical skills related to agricultural science.

RELATED ITEM LEVEL 2

Goal 2: Objective 2. Indicator 1: Research methods knowledge

Indicator Description:

Completion of the master of science curriculum requires that students complete AGRI 6350: Research Methods. This course is designed to incorporate statistical design with applied research methods in order to address the design of agricultural experiments. During the course, students read research papers, evaluating the adequacy of the statistical design related to the proposed hypothesis for each of these papers. Ability to identify hypothesis statements, statistical design, experimental design, and the alignment of these items will be evaluated on the final paper assignment. Assignments will be evaluated by a rubric that scores students from 1 (poor) to 3 (excellent).

Criterion Description:

Faculty expect 100% of graduate students will receive at least a 2 out 3 on all areas of the rubric, indicating mastery of statistical and experimental design knowledge.

Findings Description:

Sixteen students participated in the assessment. Out of 16 students, 87.5% achieved at a score of 2 or greater on the article review.

RELATED ITEM LEVEL 3

Goal 2: Objective 2, Indicator 1: Research methods knowledge

Action Description:

Findings show that while students performed well in many areas, there are still clearly deficiencies in their knowledge. As a result, it is suggested that the instructors of our statistics and Research methods courses evaluate the instruction so the deficient areas con be better covered for the coming academic year.

Update to Previous Cycle's Plan for Continuous Improvement

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

Closing Summary

Goal 1: We plan to continue to implement assessments of the three-minute thesis, twelve-minute presentation, and the 300-word abstracts. However, the rubrics for both the twelve-minute presentation and three-minute thesis need to be updated to reflect their current format to validate the results seen. These indicators are vital because they focus on different communication skill sets. Abstracts represent formal communication skills of the basic sciences whereas the three-minute thesis reflects an ability to explain science to a general interest audience and to create interest in your research.

Goal 2: We plan to continue data collection on the comprehensive exam question and have the goal of collecting data on all graduating graduate students in the School. Students did not reach the desired levels, so investigation in where a deficiency may exist is deemed worthwhile. While investigation may be useful, this is still a small portion of students and is too small to warrant any majors changes at this point. The common question was administered in written format to both thesis and non-thesis students, and we will continue this format. Student answers were evaluated by one faculty member in order to be consistent. The evaluation of the research methods paper will be continued as we resume normal campus operations.

Update of Progress to the Previous Cycle's PCI:

While most of the goals for the previous cycle's PCI were met, there is still room for improvement within these goals. We intend to increase the performance of those students for Goal 1 as they previous goals were readily met, and maintain the goals for Goal 2 as they were barley met with a small number of students.

New Plan for Continuous Improvement

Closing Summary:

Goal 1: We plan to continue to implement assessments of the three-minute thesis, twelve-minute presentation, and the 300-word abstracts. However, the rubrics for both the twelve-minute presentation and three-minute thesis need to be updated to reflect their current format to validate the results seen. These indicators are vital because they focus on different communication skill sets. Abstracts represent formal communication skills of the basic sciences whereas the three-minute thesis reflects an ability to explain science to a general interest audience and to create interest in your research.

Goal 2: We plan to continue data collection on the comprehensive exam question and have the goal of collecting data on all graduating graduate students in the School. Students did not reach the desired levels, so investigation in where a deficiency may exist is deemed worthwhile. While investigation may be useful, this is still a small portion of students and is too small to warrant any majors changes at this point. The common question was administered in written format to both thesis and non-thesis students, and we will continue this format. Student answers were evaluated by one faculty member in order to be consistent. The evaluation of the research methods paper will be continued as we resume normal campus operations.

2021-2022

Animal Science BS

Goal 1- Professional Marketplace Skills

Goal Description:

Students earning a BS in Animal Science will have the skills necessary to seek initial job placement as they begin their professional careers.

Providing Department: Animal Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 1- Objective 1: Job Application and Interview Skills

Learning Objective Description:

Students will demonstrate job application and interview skills.

RELATED ITEM LEVEL 2

Goal 1- Objective 1. Indicator 1: Professional Employment Portfolio in AGRI 4120

Indicator Description:

This course addresses essential skills necessary for job placement in the work force including resume preparation, interview skills, technical writing skills, and how to seek out employment opportunities. During this assignment students develop job application materials and answer questions relating to actual animal science job openings that have been collated by the faculty. Students compile their assignments into a portfolio, which is reviewed by the animal science faculty using the attached rubric. The portfolio is worth a total of 100 points and is broken down into 20 points for filling out the application, 35 points for the cover letter, and 45 points for their resume. Please see the faculty-developed rubric for further details.

Attached Files

Position Application Evaluation Rubric 2019.docx

Criterion Description:

Students continue to perform well on this assessment item. We plan to continue to collect data, as professionalism is of critical importance for attaining a job after graduation. The criterion for the upcoming cycle is that at least 80% of students perform at an above average level (4/5) or higher, for each of the components within the three parts of the portfolio. This is the third year that data will be collected.

Findings Description:

Findings:

Twenty-eight students completed the assessment in 2021-2022. The percent of students achieving at a level of 4 or greater is indicated below.

	total
Application grammatical correctness	97%
Application neatness	90%
Application clarity	92%
Cover Letter Neatness	95%
Cover Letter Wordiness	95%
Cover Letter Alignment	90%
Cover Letter Grammatical Correctness	95%
Cover Letter Clarity of Information	92%
Resume Neatness	89%
Resume Organization	97%
Resume Grammatical Correctness	100%
Resume Information	87%

RELATED ITEM LEVEL 3

Goal 1- Objective 1, Indicator 1: Professional Employment Portfolio in AGRI 4120

Action Description:

Two assessment cycle's data are contained in this report. Our students have demonstrated high achievement on all areas of the rubric. We plan to continue collecting data on this assessment item as learning returns to in person instruction.

RELATED ITEM LEVEL 2

Goal 1: Objective 1. Indicator 2: Phone and Face-to-Face Interviews in AGRI 4120

Indicator Description:

All students seeking a degree in Animal Science are required to complete AGRI 4120 as upperclassmen. During the completion of this course all students must complete a phone and face-to-face interview with animal science faculty. Interview skills are assessed by the animal science faculty using the attached rubric and feedback is provided to the students immediately following completion of each interview. Each interview is worth 100 points. Please see the faculty-developed rubric for further details.

Attached Files

Face-to-Face Interview Evaluation Rubric 2019.docx

Telephone Interview Evaluation Rubric 2019.docx

Criterion Description:

Our expectation is that 70% of students will achieve at least a 3 out of 5 or greater on all aspects of the rubric. We did not meet this goal for three rubric items during the previous assessment cycle, therefore our goal remains unchanged.

Findings Description:

Twenty-eight students completed the assessment in 2021-2022. The percent of students achieving at a level of 4 or greater is indicated below.

Telephone Interview

	total
1st impression	53%
professionalism	89%
communication skills	46%
response to questions	11%

Face to Face Interview

	total
1st impression	57%
professionalism	64%
communication skills	57%
response to questions	54%

RELATED ITEM LEVEL 3

Goal 1: Objective 1, Indicator 2: Phone and Face-to-Face interviews in AGRI 4120

Action Description:

Post-COVID students have not performed as well as expected. Scores are significantly lower than what was seen before COVID with the same model. Faculty will reevaluate teaching techniques as well as the communication of expectations to students at the onset of the course for the current cycle.

RELATED ITEM LEVEL 1

Goal 1- Objective 2: Professional Online Identity

Learning Objective Description:

Students will develop a professional online identity.

RELATED ITEM LEVEL 2

Goal 1- Objective 2. Indicator 1: LinkedIn Profiles

Indicator Description:

All students seeking a degree in Animal Science are required to complete AGRI 4120 as upperclassmen. During the completion of this course all students must develop a professional online identity using LinkedIn. Profiles are evaluated using a faculty-developed rubric, which is attached to this assessment plan.

Attached Files

4120 LinkedIn Profile Rubric 2.docx

Criterion Description:

Our expectation is that 70% of students will achieve at least a 3 out of 5 or greater on all aspects of the rubric. During the 2019-2020 assessment cycle we did not meet this goal on 1 out of 6 rubric components, therefore we will continue to work on meeting this goal.

Findings Description:

Twenty-eight students completed the assessment in 2021-2022. The percent of students achieving at a level of 4 or greater is indicated below.

	2021-2022

Photo	93%
headline	61%
About	68%
Experience	68%
Accomplishments	79%
Education	93%

RELATED ITEM LEVEL 3

Goal 1- Objective 2, Indicator 1: LinkedIn Profiles
Action Description:

As students fell short in 3 areas, we will focus on those areas for the coming cycle and reevaluate instruction of those areas.

Goal 2- Mastery of Key Disciplinary Knowledge

Goal Description:

Students will exhibit mastery of key disciplinary knowledge in animal science and animal production.

Providing Department: Animal Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 2- Objective 1: Basic Animal Science Knowledge
Learning Objective Description:

Students will be able to recall and explain factual and fundamental knowledge relative to the science of domestic livestock.

RELATED ITEM LEVEL 2

Goal 2- Objective 1. Indicator 1: Embedded Test Questions in ANSC 1319
Indicator Description:

All students enrolled in the Animal Science program must complete Animal Science (ANSC 1319), which is an introductory animal science course. This course addresses basic concepts of animal nutrition, management, reproduction, and behavior that are relevant to the field of animal science. Embedded test questions, which consist of multiple choice type questions, on the three exams will be used to assess student learning.

Criterion Description:

At least 70% of the students will identify the correct answer on embedded test questions focusing on the basic concepts of animal science. The 2019-2020 assessment cycle was the first assessment cycle to assess this knowledge and our goal was met in all categories. We plan to continue collecting data on this assessment cycle as the COVID 19 pandemic disrupted teaching styles during the spring semester.

Findings Description:

The percent of students achieving the indicator goal for each category is as follows:

Category	% Correct
Nutritional Anatomy	70.6
Nutritional Function	64.7
Animal Growth and Performance	77.0
Reproductive Anatomy	66.1
Reproductive Function	70.5

RELATED ITEM LEVEL 3

Goal 2- Objective 1, Indicator 1: Embedded Test Questions in ANSC 1319
Action Description:

While close to expectations, some areas (reproductive anatomy and nutritional function) fell short of the 70% threshold. Therefore, those areas will be focused on and reevaluated for the coming cycle.

RELATED ITEM LEVEL 1

Goal 2- Objective 2: Advanced Animal Science Knowledge
Learning Objective Description:

Students will develop factual and fundamental knowledge relative to the science of domestic livestock. Upon completion of the course, students will be able to apply the gained factual and fundamental knowledge relative to animal science and apply the information regarding animal nutrition and management.

RELATED ITEM LEVEL 2

Goal 2- Objective 2. Indicator 1: Embedded Test Questions in ANSC 3373
Indicator Description:

All students enrolled in the Animal Science program must complete Animal Nutrition (ANSC 3373), which is an advanced animal science course. This course addresses key concepts of nutrition and management that are relevant to the field of animal science. Further, this course presents knowledge that is considered necessary for all animal science graduates. Embedded test questions (n= 398) were developed and administered during the 4 exams offered each semester. Questions are classified as factual, fundamental, and application knowledge. Whereas, factual knowledge is

presented in to students for the first time during 3373, fundamental knowledge is knowledge learned in prior coursework, and application knowledge involves the utilization of both factual and fundamental knowledge. Student scores on questions are categorized on a scale of 1 - 5 with 3 "meets expectations," 4 "exceeds expectations," and 5 "far exceeds expectations."

Criterion Description:

Although there are fluctuations from year to year and a general trend for improvement, we are still working on achieving the goal of 70% of students scoring a 3 out of 5 in all areas. The addition of 2 pre-requisites (chemistry 1406 and a "c" or better in ANSC 1319) was recent, and there are still students being "grandfathered" in under old requirements in order to not delay graduation. Therefore, we will retain our goal of 70% of students meeting expectations (scoring 3 out of 5) in all areas.

Findings Description:

The assessment method for ANSC 3373 changed from the previous assessment period due to change in testing methods and formation of 'open response' questions. One open response type questions were embedded in each of the four exams for the course, across both fall 2021 and spring 2022, semesters. For the student to properly answer the questions it required the application of knowledge from factual and fundamental concepts taught with in the subject matter for each exam.

Eight-one students enrolled in ANSC 3373 in fall 2021 and spring 2022 with 86 students, therefore, 668 individual responses were assessed. The application of knowledge style questions required the student to apply the factual and fundamental knowledge into everyday animal husbandry situations or biochemical and physiological processes associated with nutrition.

On average, the students answered the questions in a way that was 58% accurate. Expectation was 70% accurate response rate. This change in testing style did not align with how the students studied or prepared for the class, even though examples were provided in class and the professor made certain to apply the content in a way that would be similar to the testing style.

RELATED ITEM LEVEL 3

Goal 2- Objective 2, Indicator 1: Embedded Test Questions in ANSC 3373

Action Description:

Due to this change in assessment, further analysis and more data is required before accurate assessments can be formulate on meeting or falling short of expectations.

RELATED ITEM LEVEL 2

Goal 2: Objective 2. Indicator 2: Identifying Anatomical and Physiological Structures in ANSC 3363

Indicator Description:

All students enrolled in the Animal Science program must complete Anatomy and Physiology of Domestic Animals (ANSC 3363), which is an advanced animal science course. The ability to identify anatomical and physiological structures will be evaluated during a practical exam.

Criterion Description:

At least 70% of students will demonstrate the ability to identify each of the major structures presented in class. This item has only been assessed under COVID19 restrictions, therefore we plan to continue data collection through the resumption of normal campus operations, prior to making any changes.

Findings Description:

In this cycle, 86.5% of students were able to successfully identify cardiovascular structures was as follows.

RELATED ITEM LEVEL 3

Goal 2: Objective 2, Indicator 2: Identifying Anatomical and Physiological Structures in ANSC 3363

Action Description:

As this exceeds the expectations of the faculty, we will increase the level this coming year to 80% of students.

Goal 3- Industry Skills

Goal Description:

Students will demonstrate skills necessary for working in the animal science industries.

Providing Department: Animal Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 3- Objective 1: Animal Handling Skills in Lower Division Labs

Learning Objective Description:

Students will demonstrate skills related to basic animal handling.

RELATED ITEM LEVEL 2

Goal 3- Objective 1. Indicator 1: Participation in Animal Science Labs

Indicator Description:

All students enrolled in the Animal Science program must complete Animal Science Lab (ANSC 1119), which provides students with exposure to a variety of domestic livestock. Each week of the semester presents a new procedure, including, but not limited to, grooming horses, quality grading eggs, administering vaccines to cattle, and trimming goat hooves. Students are also introduced to basic animal handling procedures. Laboratory instructors record both attendance and active participation of students for each lab.

Criterion Description:

All (100%) students will actively engage in 2 or more animal handling experiences during the course of 1119. Active engagement means that they participated in handling an animal or practiced a procedure after watching a demonstration. The level of participation in the activity depends on the nature of the lab. We did not meet our goal during the previous assessment cycle, therefore this goal remains unchanged.

Findings Description:

As labs were restarted after COVID restrictions were loosened, the labs did not reflect the same number of hands-on labs as it did pre-COVID. While many students (88%) engaged in 2 or more animal handling experiences, it fell short of the expected 100% due to the alterations in labs.

RELATED ITEM LEVEL 3

Goal 3-Objective 1. Indicator 1: Participation in Animal Science Labs

Action Description:

We did not meet our goal during the previous assessment cycle, therefore this goal remains unchanged, but labs will continue to head to their pre-COVID formats.

RELATED ITEM LEVEL 1

Goal 3: Objective 2- Advanced Animal Handling and Production Skills

Learning Objective Description:

Students will demonstrate mastery of advanced animal handling and production skills that are necessary for working in the animal science industries.

RELATED ITEM LEVEL 2

Goal 3: Objective 2. Indicator 1- Ration Formulation in ANSC 4394

Indicator Description:

All students enrolled in the Animal Science program must complete Animal Feeds and Feeding (ANSC 4394), which is an advanced animal science course. This course applies knowledge from earlier animal science courses and requires students to develop diets for production livestock. Students will develop an industry standard 2-ingredient diet during an exam.

Criterion Description:

At least 70% of students will demonstrate the ability to correctly balance a 2-ingredient diet. During the previous assessment cycle, this goal was met, however the course was disrupted by the COVID19 pandemic, and therefore we plan to continue to collect data until we resume normal campus operations.

Findings Description:

The percent of students able to correctly balance a two ingredient ration was 68.9%.

RELATED ITEM LEVEL 3

Goal 3: Objective 2. Indicator 1- Ration Formulation in ANSC 4394

Action Description:

As this fell short of faculty expectations, we will review the instruction method of the math portion of the course and reevaluate.

Update to Previous Cycle's Plan for Continuous Improvement

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

Closing Summary

Goal 1:

Firstly, we plan to continually monitor student progress on the current indicator (professional employment portfolio), in order to ensure that students continue to perform well.

Secondly, our evaluation of interview skills revealed that students performed below expectations in both interviews (face to face and telephone interviews). This may be due to these students having approximately 2 years of online courses due to COVID as these scores are significantly lower than previous years. Further collection of data is needed before any alterations are made.

For our second learning objective to Goal 1, the creation of a professional LinkedIn identity, students continued to perform well on most aspects of the rubric with a few scores just below our threshold. We plan to continue to collect data on this assessment item with no major changes.

Goal 2:

We continue to monitor achievement on embedded test questions in 3373, but due to the new structure these need will need to be evaluated differently than previous data. We plan to continue to montior the content of ANSC 1319 as scores have been inconsistent from year to year and this course provides the foundation of factual and foundational knowledge.

Student performance on embedded test questions in ANSC 1319 did not meet our target goal in all areas. We plan to continue to review the content of the course as an ANSC faculty group to ensure that content is consistent across sections and up to date with current knowledge.

Goal 3:

We developed a new goal of demonstrating skills and being involved in experiential learning. We were able to collect some of the data on ANSC 1119 lab participation during the previous cycle, but plan to collect in the upcoming cycle, as we continue to work towards resuming normal operations.

Student performance in ANSC 4394 fell just shy of the learning objectives. However, this assessment data has never been collected under normal teaching methods in the past, so our goal is to continue data collection as campus resumes normal operation.

Update of Progress to the Previous Cycle's PCI:

Goal 1:

Firstly, we plan to continually monitor student progress on the current indicator (professional employment portfolio), in order to ensure that students continue to perform well.

Secondly, our evaluation of interview skills revealed that students performed below expectations in both interviews (face to face and telephone interviews). This may be due to these students having approximately 2 years of online courses due to COVID as these scores are significantly lower than previous years. Further collection of data is needed before any alterations are made.

For our second learning objective to Goal 1, the creation of a professional LinkedIn identity, students continued to perform well on most aspects of the rubric with a few scores just below our threshold. We plan to continue to collect data on this assessment item with no major changes.

Goal 2:

We continue to monitor achievement on embedded test questions in 3373, but due to the new structure these need will need to be evaluated differently than previous data. We plan to continue to montior the content of ANSC 1319 as scores have been inconsistent from year to year and this course provides the foundation of factual and foundational knowledge.

Student performance on embedded test questions in ANSC 1319 did not meet our target goal in all areas. We plan to continue to review the content of the course as an ANSC faculty group to ensure that content is consistent across sections and up to date with current knowledge.

Goal 3:
We developed a new goal of demonstrating skills and being involved in experiential learning. We were able to collect some of the data on ANSC 1119 lab participation during the previous cycle, but plan to collect in the upcoming cycle, as we continue to work towards resuming normal operations.

Student performance in ANSC 4394 fell just shy of the learning objectives. However, this assessment data has never been collected under normal teaching methods in the past, so our goal is to continue data collection as campus resumes normal operation.

New Plan for Continuous Improvement

Closing Summary:

Goal 1:
Firstly, we plan to continually monitor student progress on the current indicator (professional employment portfolio), in order to ensure that students continue to perform well.

Secondly, our evaluation of interview skills revealed that students performed below expectations in both interviews (face to face and telephone interviews). This may be due to these students having approximately 2 years of online courses due to COVID as these scores are significantly lower than previous years. Further collection of data is needed before any alterations are made.

For our second learning objective to Goal 1, the creation of a professional LinkedIn identity, students continued to perform well on most aspects of the rubric with a few scores just below our threshold. We plan to continue to collect data on this assessment item with no major changes.

Goal 2:
We continue to monitor achievement on embedded test questions in 3373, but due to the new structure these need will need to be evaluated differently than previous data. We plan to continue to montior the content of ANSC 1319 as scores have been inconsistent from year to year and this course provides the foundation of factual and foundational knowledge.

Student performance on embedded test questions in ANSC 1319 did not meet our target goal in all areas. We plan to continue to review the content of the course as an ANSC faculty group to ensure that content is consistent across sections and up to date with current knowledge.

Goal 3:
We developed a new goal of demonstrating skills and being involved in experiential learning. We were able to collect some of the data on ANSC 1119 lab participation during the previous cycle, but plan to collect in the upcoming cycle, as we continue to work towards resuming normal operations.

Student performance in ANSC 4394 fell just shy of the learning objectives. However, this assessment data has never been collected under normal teaching methods in the past, so our goal is to continue data collection as campus resumes normal operation.

Sustainable Agriculture and Food Environment MAG

Goal 1- Technical Agriculture Knowledge

Goal Description:

Graduate students will utilize technical knowledge to defend sustainable agriculture viewpoints.

Providing Department: Sustainable Agriculture and Food Environment MAG

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 1- Objective 1: Sustainable Agriculture Knowledge

Learning Objective Description:

Students will demonstrate advanced technical knowledge in a variety of topics relevant to sustainable agriculture.

RELATED ITEM LEVEL 2

Goal 1- Objective 1. Indicator 1: Sustainable Agriculture Knowledge in SAFE 5373 and 5312

Indicator Description:

Courses are taught on a rotating basis, therefore SAFE 5373 will be taught in odd fall/even spring years and SAFE 5312 will be taught in even fall/odd spring years. Assignments and/or embedded test questions will be evaluated for both courses.

Criterion Description:

In SAFE 5373, embedded test questions focusing on microbiology, food safety and food regulation will be evaluated. In SAFE 5312, a writing assignment focused on marketing strategies will be evaluated using a rubric. In both courses, it is our expectation that 70% of our students score a 70% or better on the assessments in SAFE 5373 and 5312. Ten students have been included in the assessment of odd fall/even spring rotating classes, we will continue to collect data until 25 students are included in the assessment.

Findings Description:

In SAFE 5312, 100% of our students scored a 70% or better on the writing assignment focused on marketing strategies. This brings the total to 23 students for this assessment.

RELATED ITEM LEVEL 3

Goal 1- Objective 1. Indicator 1: Sustainable Agriculture Knowledge in SAFE 5373 and 5372

Action Description:

At this time, we will continue to collect data until the 25 student threshold is met.

RELATED ITEM LEVEL 1

Goal 1- Objective 2: Written Debates in SAFE 5311 and 5351

Learning Objective Description:

Students will demonstrate the ability to write and defend an opinion using technical knowledge of sustainable agriculture.

RELATED ITEM LEVEL 2

Goal 1- Objective 2. Indicator 1: Written Debates in SAFE 5311 and 5351

Indicator Description:

Courses are taught on a rotating basis, therefore SAFE 5311 will be taught in odd fall/even spring years and SAFE 5351 will be taught in even fall/odd spring years. Writing assignments from each course will be evaluated using rubrics.

Criterion Description:

In SAFE 5311, students select an agricultural topic of their own choosing and write a 6-10 page paper supported by scientific literature and real-life examples. The issues paper will be evaluated by rubric, and it is our expectation that 70% of our students score a 70% or better on the assessment. In SAFE 5351, a writing assignment focused on marketing strategies will be evaluated using a rubric, with a goal that 70% of students achieve at least a 3 out of 4 or greater on rubric components. Ten students have been included in the assessment of odd fall/even spring rotating classes, we will continue to collect data until 25 students are included in the assessment.

Findings Description:

In SAFE 5311, students selected an agricultural topic of their own choosing and wrote a 6-10 page paper supported by scientific literature and real-life examples. The issues paper was evaluated by rubric, and 86% of our students scored a 70% or better on the assessment. This brings the total to 28 students for this assessment.

RELATED ITEM LEVEL 3

Goal 1- Objective 2. Indicator 1: Written Debates in SAFE 5311 and 5351

Action Description:

The data currently collected students seem to be meeting the expectations of the program and we have meet the 25 student threshold is met. However, alterations to this objective will be made one both objectives 1 and 2 have reached the 25 student threshold.

Update to Previous Cycle's Plan for Continuous Improvement

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

Closing Summary

The plan contains two learning objectives, one that focuses on student performance on technical information and the second on student abilities to write and defend their position on key issues. This allows for an understanding of background perceptions, a gauge of learning of knowledge related to the field, and an assessment of written communication and reasoning skills.

We will continue to identify courses taught in each of these areas that can provide assessment data and working with instructors to develop rubrics for identified assignments. This should allow for a more complete understanding of where our students are coming from and how the program directs and

prepares them for the future.

Update of Progress to the Previous Cycle's PCI:

The plan contains two learning objectives, one that focuses on student performance on technical information and the second on student abilities to write and defend their position on key issues. This allows for an understanding of background perceptions, a gauge of learning of knowledge related to the field, and an assessment of written communication and reasoning skills.

We have 23 responses in objective 1 and 28 in objective 2. Therefore we will continue to evaluate assessment data taught in each of these areas until we have a minimum of 25 responses for each objective. This should allow for a more complete understanding of where our students are coming from and how the program directs and prepares them for the future.

New Plan for Continuous Improvement

Closing Summary:

The plan contains two learning objectives, one that focuses on student performance on technical information and the second on student abilities to write and defend their position on key issues. This allows for an understanding of background perceptions, a gauge of learning of knowledge related to the field, and an assessment of written communication and reasoning skills.

We will continue to identify courses taught in each of these areas that can provide assessment data and working with instructors to develop rubrics for identified assignments. Additionally, we will likely break our threshold of 25 responses for this cycle and be able to make alterations to our plan going forward so that we can have a more complete understanding of where our students are coming from and how the program directs and prepares them for the future.

Wildlife Ecology Minor

Goal 1- Mastery of Key Disciplinary Knowledge

Goal Description:

Students will exhibit mastery of key disciplinary knowledge in animal science and animal production.

Providing Department: Wildlife Ecology Minor

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 1- Objective 1: Advanced Animal Science Knowledge

Learning Objective Description:

Students will develop factual and fundamental knowledge relative to the science of domestic livestock. Upon completion of the course, students will be able to apply the gained factual and fundamental knowledge relative to animal science and apply the information regarding animal nutrition and management.

RELATED ITEM LEVEL 2

Goal 1- Objective 1. Indicator 1: Embedded Test Questions in ANSC 3373

Indicator Description:

All students enrolled in the Animal Science program must complete Animal Nutrition (ANSC 3373), which is an advanced animal science course. This course addresses key concepts of nutrition and management that are relevant to the field of animal science. Further, this course presents knowledge that is considered necessary for all animal science graduates. Embedded test questions (n= 398) were developed and administered during the 4 exams offered each semester. Questions are classified as factual, fundamental, and application knowledge. Whereas, factual knowledge is presented in to students for the first time during 3373, fundamental knowledge is knowledge learned in prior coursework, and application knowledge involves the utilization of both factual and fundamental knowledge. Student scores on questions are categorized on a scale of 1 - 5 with 3 "meets expectations," 4 "exceeds expectations," and 5 "far exceeds expectations."

Criterion Description:

Although there are fluctuations from year to year and a general trend for improvement, we are still working on achieving the goal of 70% of students scoring a 3 out of 5 in all areas. The addition of 2 pre-requisites (chemistry 1406 and a "c" or better in ANSC 1319) was recent, and there are still students being "grandfathered" in under old requirements in order to not delay graduation. Therefore, we will retain our goal of 70% of students meeting expectations (scoring 3 out of 5) in all areas.

Findings Description:

The assessment of 184 students enrolled in ANSC 3373 in Fall 2020 and Spring 2021 with 398 embedded questions from 4 exams across 2 semesters. The 398 questions were classified as factual, application or fundamental knowledge. Factual questions were based on facts learned about animal nutrition in the course; fundamental questions required the student to recall information learned in pre-requisite courses or should be fundamental knowledge for an advanced, upper level animal science student, application questions required the student to apply the factual and fundamental knowledge into everyday animal husbandry situations or biochemical and physiological processes. The majority of the questions were factual (54.62%) followed by fundamental (23.29%) and application (22.09%). All exams had a combination of all three-question types with an increased expectation of the student to apply the information through application questions.

Majority (76.51%) of the students answered the questions in a way that exceeded the expectations of 3 or greater (acceptable/adequate knowledge or better), a marginal (.22% point decrease) from the previous assessment period. Overall, 59.84%, an increase of over 7% from the previous year) of students answered questions that indicated substantial or exceptional knowledge and understanding (Score of 4 or 5) of animal nutrition. Fundamental knowledge score fell short of expectations, students, on average, scored lower on the fundamental knowledge questions, overall, with a decrease from 73.1% to 66.38% for this period, scoring a 3 or higher.

With the implementation of a Chemistry pre-requisite, a C or better in ANSC 1319, and delaying “first semester” transfer students from taking Nutrition, improvement in overall scores were noted, even when remote delivery methods were mandated in fall of 2020 due to COVID-19. However, fundamental knowledge remains the low performing area in the course with no improvement and decreased performance. Continued monitoring of ANSC 1319 content is warranted and ensure that content is equitable across all sections with differing instructors.

The table below shows the previous years' data and the percentage of students averaged across years.

Component	2017-2018 n=226	2018-2019 n=154	2019-2020 n=211	3 year average	2020-2021 n=184	4 year average
Factual	57%	75%	53%	60%	59.8%	63%
Fundamental	52%	62%	73.1%	62%	66.4%	67%
Application	57%	71%	76.7%	68%	76.5%	74%

RELATED ITEM LEVEL 3

Goal 1- Objective 1, Indicator 1: Embedded Test Questions in ANSC 3373

Action Description:

We have collected data on this assessment item for four assessment cycles and the data set now includes 775 students. With the implementation of a Chemistry pre-requisite, a C or better in ANSC 1319, and delaying “first semester” transfer students from taking Nutrition, improvement in overall scores were noted, even when remote delivery methods were mandated in fall of 2020 due to COVID-19. However, fundamental knowledge remains the low performing area in the course with no improvement and decreased performance. Continued monitoring of ANSC 1319 content is warranted to ensure that content is equitable across all sections with differing instructors. Secondly, a trend for improvement in Application type questions is evident. This is likely due to the previously noted changes to pre-requisites.

New Update to Previous Cycle's Plan for Continuous Improvement Item

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

This is a new plan for the 2021-2022 assessment cycle. No previous PCI available.

Update of Progress to the Previous Cycle's PCI:

This is a new plan for the 2021-2022 assessment cycle. No previous PCI available.

New Plan for Continuous Improvement Item

Closing Summary:

We will continue the program as planned and monitor the students. We believe we need more data to have more reliable findings and decide on proper actions required.

Department of Biological Sciences

Biology BA/BS

Demonstrate Mastery of Core Concepts in the Field of Biology

Goal Description:

Students completing the core courses required for a BS will demonstrate knowledge of core concepts of cell biology, biodiversity, genetics and evolution.

Providing Department: Biology BA/BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Mastery Of Core Curriculum

Learning Objective Description:

Students completing the core courses required for a BS will demonstrate knowledge of core concepts of cell biology, biodiversity, genetics and evolution.

RELATED ITEM LEVEL 2

Mastery of Core Curriculum

Indicator Description:

All students, regardless of concentration area, take the same core courses (BIOL 1406, BIOL 1407, BIOL 3450, and BIOL 4361). Faculty teaching each of these courses will agree on a set of embedded questions to include on the final exam. Students will correctly answer these embedded questions.

Criterion Description:

Students will score 70% on the embedded questions.

Findings Description:

Since BIOL 1406 and 1407 were new courses, we only have one semesters worth of data and fell well below the 70% goal (58.5%). Students scored at or above 70% for the in BIOL 3450 and 4361.

RELATED ITEM LEVEL 3

Mastery of Core Curriculum

Action Description:

Determine the best ways for students in BIOL 1406 and 1407 to master the core competencies. This proved difficult this past year as we had a high DFWQ rate in BIOL 1406 and 1407. In addition, faculty reported that there was very low student engagement during the semester.

Demonstrate an Understanding of Scientific Reasoning and Critical Thinking

Goal Description:

Students completing an undergraduate degree in the Biological Sciences will demonstrate an understanding of scientific reasoning and the ability to think critically.

Providing Department: Biology BA/BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Scientific Reasoning and Critical Thinking

Learning Objective Description:

Students completing an undergraduate degree in the Biological Sciences will demonstrate an understanding of scientific reasoning and the ability to think critically.

RELATED ITEM LEVEL 2

Scientific Reasoning and Critical Thinking

Indicator Description:

All students are required to take BIOL 2110 (Becoming a Professional Biologist) and BIOL 4110 (Undergraduate Seminar). Among other things, in BIOL 2110 acquire professional skills such as conducting literature searches and learning to read scientific literature, while BIOL 4110 reinforces important biological concepts through the critical reading of primary literature concerning the instructor's topic of choice. In both courses, students will take the common COSET Critical Thinking/Writing exam (BIOL 2110 students will serve as the pre-test population and BIOL 4110 students will serve as the post-test population).

Criterion Description:

Student scores will improve by 50% from the pre-test to the post-test.

Findings Description:

The COSET critical thinking/writing exam was not administered this past academic year as it has been phased out. We are in the process of determining if we need to continue with something else.

RELATED ITEM LEVEL 3

Scientific Reasoning and Critical Thinking

Action Description:

Since the COSET critical thinking exam has been phased out, we are in the process of determining how we want to proceed (give our own exam, the format of the exam, when and how to administer it, etc.).

Student Engagement in Undergraduate Research

Goal Description:

Students will engage in the process of scientific discovery by participating in faculty mentored research.

Providing Department: Biology BA/BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Student Engagement in Undergraduate Research

Learning Objective Description:

Students will engage in the process of scientific discovery by participating in faculty mentored research.

RELATED ITEM LEVEL 2

Undergraduate Research

Indicator Description:

Students will enroll in BIOL 4095: Undergraduate Research Topics and participate directly in faculty mentored biological research, with the goal of producing publishable research and/or quality research that can be presented at scientific conferences.

Criterion Description:

50% of each graduating class will enroll in BIOL 4095. Using the departmental Faculty Evaluation Instrument, that in part documents faculty engagement with undergraduate researchers, the department chair will track the number of peer-reviewed publications and presentations at scientific conference on which our undergraduate students appear on the author line.

Findings Description:

We 38 students in BIOL 4095 duirng the 2021-2022 academic year. This is well below the 50% for each graduating class.

RELATED ITEM LEVEL 3

Undergraduate Research

Action Description:

Continue to support undergraduate research in the department. May need to look to see how to encourage students to get involved in research.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

We will continue to process of implementing four distinct concentrations for the BS/BA degree. These concentrations will help us track student participation in research by identifying student research interests and placing students in appropriate research labs.

We will continue to administer the Critical Thinking exam and analyze the results to assess student critical thinking skills.

Update of Progress to the Previous Cycle's PCI:

The concentrations have been implemented and will be available for students starting in the fall 2022. We will then be able to track student interest and research participation.

The critical thinking exam was phased out by COSET this past year. We will need to determine what to do moving forward.

New Plan for Continuous Improvement Item

Closing Summary:

We did not hit all of the benchmarks for this degree. We will discuss how we can improve moving forward by identifying areas where improvement is needed and devise strategies to hit each benchmark.

Biology MS

Deliver A Curriculum with Appropriate Sub-Discipline Specific Knowledge

Goal Description:

Students will learn the advanced knowledge and skills appropriate to the sub-discipline of biology they have chosen to pursue (e.g. evolutionary biology, cell/molecular biology, microbiology, taxonomy/systematics).

Providing Department: Biology MS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Knowledge and Skills appropriate to biological subdiscipline

Learning Objective Description:

1. Each student will demonstrate the ability to communicate knowledge and skills appropriate to the biological subdiscipline they have chosen to study.
2. Students will acquire knowledge and skill sets that will make them competitive in the job market or to move on to a Ph.D. program.

RELATED ITEM LEVEL 2

Oral Comprehensive Exam

Indicator Description:

All graduate students will demonstrate a mastery of the knowledge and skills appropriate to biological subdiscipline they have chosen through an oral graduate comprehensive examination, administered by their thesis advisory committee. The thesis advisory committee will evaluate students' performance and give a mark of Fail, Pass, or High Pass in each examined area.

Criterion Description:

Each student needs to earn at least a "Pass" mark in each examined area to pass the oral comprehensive exam. Each student is allowed two attempts. Faculty expect that at least 80% of graduate students will pass their exam on their first attempt. 100% will pass on their second attempt.

Findings Description:

Over the past academic year, we had a 50% fail rate on the comprehensive exam. These students have not retaken the exam yet.

RELATED ITEM LEVEL 3

Oral Comprehensive Exam

Action Description:

The high fail rate of the comprehensive exam has caused us to reexamine the comprehensive exam. A committee has been formed to develop guidelines for the exam and a rubric to measure students knowledge.

RELATED ITEM LEVEL 2

Publication Rate

Indicator Description:

Each student's publication record will be tracked throughout the MS degree.

Criterion Description:

The number of papers published following the MS graduation will be compared to number published when admitted into the program. An increase in publications over this time will indicate the student has learned about the process through direct experience.

Findings Description:

Over the last academic year, five graduate students have published their research.

RELATED ITEM LEVEL 3

Publication Rate

Action Description:

We will continue to monitor the publication rate for each cohort of students.

Quality Research

Goal Description:

Students will produce quality, publishable research.

Providing Department: Biology MS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Knowledge and Skills of the Scientific Process

Learning Objective Description:

Students will engage in the scientific process from the development of a research question, through experimental design and analysis of results, to final dissemination through peer-reviewed publication and/or presentation at scientific conferences.

RELATED ITEM LEVEL 2

Production and Presentation of a Publishable Thesis

Indicator Description:

Students will continue to engage in the scientific process by taking two "thesis" courses in the second year of their master's program. During this time they will conduct their research, analyze their results, and write and publicly defend a publishable thesis.

Criterion Description:

The graduate coordinator will track how many students present their thesis results at scientific conferences and how many students publish their thesis results in peer-reviewed scientific journals. Faculty expect that 80% of graduating master's students will have either presented or published.

Findings Description:

Over the last academic year, over 80% of graduating students have either published or presented their research at a scientific conference.

RELATED ITEM LEVEL 3

Production and Presentation of a Publishable Thesis

Action Description:

Continue to support student research by encouraging publication and presentation of research. This may include increasing funds for research or travel.

RELATED ITEM LEVEL 2

Production of Quality Thesis Proposal

Criterion Description:

Each student needs to earn at least a B in each seminar course to proceed in the program. Faculty expect that 80% of graduate students will meet this requirement.

Findings Description:

All students enrolled in the research seminar course has earn a grade of a B for this past academic year.

RELATED ITEM LEVEL 3

Production of Quality Thesis Proposal

Action Description:

Continue to work with students to produce a thesis proposal in a timely manner.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

The department has formed a committee to assess options for the comprehensive exam. A survey will be sent out faculty members to determine preferred method of administering the exam. We are also looking at whether or not to continue to use the GRE as a metric for admission into the program and develop a rubric to identify quality students.

Update of Progress to the Previous Cycle's PCI:

We have removed the GRE as a metric for admission into the graduate program.

New Plan for Continuous Improvement Item

Closing Summary:

We have formed a committee to determine the best way to administer the comprehensive exam. This will include guidelines of what is covered and development of a rubric to assess students performance.

Biomedical Sciences BS

Demonstrate Mastery in Core Concepts in the Fields of Biology and Biomedical Sciences

Goal Description:

Students completing the core courses required for a BS will demonstrate knowledge of core concepts of cell biology, biodiversity, genetics and evolution.

Providing Department: Biomedical Sciences BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Mastery Of Core Curriculum
Learning Objective Description:

Students completing the core courses required for a BS will demonstrate knowledge of core concepts of cell biology, biodiversity, genetics and evolution.

RELATED ITEM LEVEL 2

Mastery of Core Curriculum
Indicator Description:

All students, regardless of concentration area, take the same core courses (BIOL 1406, BIOL 1407, BIOL 3450, and BIOL 4361). Faculty teaching each of these courses will agree on a set of embedded questions to include on the final exam. Students will correctly answer these embedded questions.

Criterion Description:

Students will score 70% on the embedded questions.

Findings Description:

Students in BIOL 1406 and 1407 scored well below the 70% rate (52.4%) Students in BIOL 3450 and 4361 scored at or above the 70% reate.

RELATED ITEM LEVEL 3

Mastery of Core Curriculum
Action Description:

Students in BIOL 1406 and 1407 did not perform well. This was the first time these courses were offered. Instructors of these courses will assess the material and try to identify strategies to improve student engagement.

Student Engagement in Undergraduate Research

Goal Description:

Students will engage in the process of scientific discovery by participating in faculty mentored research.

Providing Department: Biomedical Sciences BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Undergraduate Research
Learning Objective Description:

Students will engage in the process of scientific discovery by participating in faculty mentored research.

RELATED ITEM LEVEL 2

Undergraduate Research
Indicator Description:

Students will enroll in BIOL 4095: Undergraduate Research Topics and participate directly in faculty mentored biological research, with the goal of producing publishable research and/or quality research that can be presented at scientific conferences.

Criterion Description:

50% of each graduating class will have enrolled in BIOL 4095 . Using the departmental Faculty Evaluation Instrument, that tracks faculty engagement with undergraduate researchers, the department chair will track the number of peer-reviewed publications and presentations at scientific conference on which our undergraduate students appear on the author line.

Findings Description:

38 students were enrolled in BIOL 4095. This is well below the 50% benchmark for each graduating class. The majority of these students were seniors but still did not reach the 50% mark.

RELATED ITEM LEVEL 3

Undergraduate Research
Action Description:

Continue to recruit students into research. Will look into finding additional funds to student research.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

We will continue to implement the critical thinking exam in BIOL 2110 and 4110 and analyze the results to assess students critical thinking skills between sophomore and senior years. This will help where improvements can be made in the curriculum.

We have also formed an ad hoc Biomedical Sciences review committee. This committee has been charged with reviewing the curriculum during the 2021-2022 academic year and will report their recommendations to the faculty.

Update of Progress to the Previous Cycle's PCI:

The COSET critical thinking exam has been phased out.

The committee recommended slight modification to the curriculum. These changes have been implemented into the 2022 catalog.

New Plan for Continuous Improvement Item

Closing Summary:

We plan to identify new ways to recruit students into research in the department.

The instructors of BIOL 1406 and 1407 will look for ways to increase student engagement and develop strategies for students to master core competencies.

Department of Chemistry

2021-2022

Chemistry BS

Deliver A Curriculum Appropriate For Mastery Of Advanced Chemistry Topics

Goal Description:

The curriculum will provide students with opportunities to develop the skills typically required of professionals in the area of advanced chemistry topics. These topics, which include Physical Chemistry and Instrumental Analytical Chemistry, can only be understood after at least four semesters of undergraduate chemistry coursework and in some cases Calculus I, Calculus II, and a year of Physics with laboratory (all with C's or higher).

Attached Files

2015-acs-guidelines-for-bachelors-degree-programs.pdf

Providing Department: Chemistry BS

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Mastery Of Physical Chemistry

Learning Objective Description:

The material learned by the third year in the chemistry curriculum is refined and supported theoretically in Physical Chemistry I (CHEM 4448). The successful student will demonstrate a mastery of the advanced topics presented in this course. These topics include quantum theory, wave functions, the dipole approximation, electronic configuration, molecular structure, molecular orbital diagrams, symmetry, group theory, and the application of these topics to X-ray, ultraviolet, visible, infrared, Raman, and magnetic resonance spectroscopy. All sections of CHEM 4448 have been taught by Dr. Darren Williams since his arrival at SHSU in 2004.

RELATED ITEM LEVEL 2

CHEM 4448 Final Examination

Indicator Description:

CHEM 4448 is required of all chemistry majors. The final examination in Physical Chemistry I (CHEM 4448), written by Dr. Darren Williams, is recognized by the faculty of the Department of Chemistry as being comprehensive and covers all of the advanced topics listed in the objective statement. Dr. Williams is the sole instructor of CHEM 4448 at SHSU having taught all sections of CHEM 4448 since his arrival on campus in 2004. All students are required to complete the final examination. Examples of final exams are on file and secured within the Department of Chemistry and may be viewed by contacting Dr. Williams directly at williams@shsu.edu.

Criterion Description:

Seventy-five percent of chemistry majors are expected to demonstrate a mastery of at least sixty percent of the material (score 60%) on the comprehensive final examination.

Findings Description:

33/38 students (87%) scored at least 60% on the comprehensive exam, which exceeds the criteria of 75% of students. The criteria is met/exceeded.

RELATED ITEM LEVEL 1

Demonstrate Understanding Of Instrumental Analytical Methods In Chemistry

Learning Objective Description:

The modern analytical laboratory makes extensive use of electronic instrumentation for the analysis of chemical samples. Our Instrumental Analytical Chemistry course (CHEM 4440) is designed to introduce students to and have them learn the importance and use of spectrophotometric, chromatographic, and mass spectrometric analytical instrumental methods and computers in analytical laboratories. The course's laboratory component includes a focus on complex technical writing and use of the scientific literature. Students must master this material to meet the objective.

RELATED ITEM LEVEL 2

Examinations In Instrumental Analytical Chemistry

Indicator Description:

All students in Instrumental Analytical Chemistry (CHEM 4440) are required to master the electronic, sampling, schematic, and computational fundamentals of modern analytical instrumentation as evaluated by 80-minute written tests requiring essays, laboratory data evaluation, and calculator-based computation. There are three tests and a final examination in this course. The testing of this knowledge and its application is standardized within the department across all sections.

Criterion Description:

Eighty two and one half percent of chemistry majors are expected to score within one standard deviation of the mean or higher than one standard deviation above the mean on the four examinations in this class. We expect statistical variability from test to test and from year to year.

Findings Description:

The averages and standard deviations of the four exams were:

Exam 1: 95.6 +/- 13.1 (so one std dev below the mean was 82.5, 33 out of 36 exceeded so 91.7% exceeded with meets criteria)

Exam 2: 80.1 +/- 9.4 (70.7, all 36 students exceeded this so the criteria is met)

[Exam 3 was not given]

Final Exam: 97.6 +/- 18.5 (79.1, 30 of 35 students exceeded so 86% which meets criteria)

For all three exams given, the criteria was met, so the overall criteria is met.

RELATED ITEM LEVEL 1

Demonstrate Understanding of Biochemistry

Learning Objective Description:

Biochemistry is basically the study of the chemistry of living things. Fundamental knowledge in Biochemistry (as taught in the required first semester course) includes understanding the differences between the various classes of biological molecules, understanding the structure and function of proteins (especially enzymes), understanding how enzymes catalyze chemical reactions and how they are regulated. Students should also understand how the molecules of biochemistry are studied.

RELATED ITEM LEVEL 2

Students Can Accurately Represent The Structure Of A Simple Protein

Indicator Description:

Students who understand biochemistry and specifically protein structure should be able to draw an accurate chemical structure of a peptide given a sequence. This will be measured by asking the following question (the sequence given may change in different semesters) on the final exam of CHEM 3438 sections:

"Your friend in class are so happy to be finished that they decide to get a tattoo of the peptide FINISHED on their back. They have asked you to draw the structure of the peptide correctly as it would exist at pH 7.4 (showing all the correct ionization states). Please do so below, and remember, your friend will have this tattoo pretty much forever, so please get it right. (Note: You may use the back of the page for more space if needed, and feel free to draw a dangling bond on the right side of the page and continue the structure on another line if it helps.)"

Note: "FINISHED" is the amino acid sequence (using one-letter amino acid abbreviations) for the peptide they are asked to draw.

Criterion Description:

The question will be scored out of six points. The criteria will be met if at least 80% of students score at least 5/6 on the question, which is scored by the instructor of record. Points are deducted for having wrong termini or backbone (3 points, students are warned in class this is considered a major error on this kind of question), wrong amino acid side-chains (credit/deduction varies by how different the answer is from the correct structure), and for showing the correct structure in the wrong ionization state for the stated pH (1 pt).

Findings Description:

In fall 2021 in CHEM 3438.02 the question was given to 32 students with the following results:

6/6	8 students
5/6	7 students
4/6	4 students
3/6	4 students
2/6	2 students
1/6	6 students
0/6	1 student

Since 15/32 students scored 5/6 or higher which is 47% of students, this was well below the 80% criterion and the criterion was not met. The question was not used in Spring 2022.

The criteria is not met. Learning peptide structure depends heavily on prerequisite knowledge from Organic Chemistry and some from General Chemistry. In classroom discussions, it is apparent that students are remembering surprisingly little from their prerequisite courses, and that is likely contributing. In the future, a better attempt to measure that knowledge and hone it in class through discussions and assignments will be made.

RELATED ITEM LEVEL 3

Organic Chemistry Knowledge

Action Description:

Although the ACS Organic Exam results were borderline (failed to meet the criteria technically, but within rounding expectations), the measure of student ability to represent the chemical structure of a simple protein failed and it is believed based on interactions in later courses that students are not learning or retaining knowledge in the area sufficiently to handle content that builds on it. Therefore, we will increase the utilization of Organic Chemistry in in-class activities in the flipped course CHEM 3438 Biochemistry I. This will allow students to review Organic and practice it as part of that course, for which this knowledge is pre-requisite.

RELATED ITEM LEVEL 2

Students Can Explain What An Enzyme Is And How It Works

Indicator Description:

Students who demonstrate an understanding of biochemistry, and more specifically the nature of enzymes, will be able to answer the question "Explain what an enzyme is and how it works to a student finishing Organic Chemistry II class." This question will be asked on the final exam in a section of CHEM 3438 Biochemistry I as a free-response question.

Criterion Description:

The question will be scored out of four points. If at least 90% of students (set high as this knowledge is very fundamental to understanding of biochemistry) can achieve a score of at least three out of four points on the question, than the criterion has been met.

Findings Description:

Out of 32 exams in CHEM 3438.02 in Fall 2021, 28 scored 4/4, 3 scored 3/4, and 1 scored 1/4. Based on these results, 97% of students could answer the question correctly (as defined by getting at least 3/4) and the criterion is met. The question was not asked again in Spring 2022.

[Note: Unlike the peptide structure question used in another indicator/criterion/findings, this question does not depend very deeply on pre-requisite knowledge other than a basic understanding of what a catalyst is. This likely explains why the other question failed by a significant margin and this question succeeded by a wide margin.]

RELATED ITEM LEVEL 2

Students Will Self-Report That They Learned A Lot in CHEM 3438 Biochemistry I

Indicator Description:

As a complement to exam question assessments, students will be asked to self-assess how much they learned in CHEM 3438 Biochemistry I on a post-course Qualtrics survey. The survey instrument is given to students at the end of the semester (distributed approximately one week before the last day of class).

Students are asked to evaluate "On a scale of 1 to 100, how much do you agree with each statement" and a statement "I learned a lot this semester." is rated. The question defaults to a neutral score of 50.

Criterion Description:

If 80% of students give an agreement rating of 75% or more, this will be deemed successful.

Findings Description:

Of the 32 students in fall CHEM 3438.02 Biochemistry I, 16 responded to the survey. Here are the responses:

Rating	Number of Students
100	10
94	1
93	1
90	1
86	1
80	1
79	1

As can be seen, 100% of responding students agreed at a score of 75 or higher, exceeding the criteria. Ten students (63%) gave a perfect rating of 100.

The survey results from Spring 2022 are attached as a PDF file. In the spring semester, 25/28 people agreed at a level of 75 or higher (89%) with 17 of the students (612) giving a perfect rating of 100. The lowest score was 50, followed by 71 as the second-lowest.

Overall, then, 41/44 students agreed at a level of 75 or higher, which is 93%. This greatly exceeds the criteria of 80% so the criteria is met.

Attached Files

CHEM3438 Spring 2022 Learning Self-Assessment.pdf

Deliver A Curriculum Appropriate for Understanding Basic Chemistry

Goal Description:

Deliver an education in foundational and organic in-depth coursework (chemistry coursework from the first half of a BS degree) that provides knowledge and skills aligned with professional expectations, for example those described in the attached American Chemical Society Guidelines for Bachelors Degree Programs.

Attached Files

2015-acs-guidelines-for-bachelors-degree-programs.pdf

Providing Department: Chemistry BS

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Understanding Of Chemistry Fundamentals

Learning Objective Description:

Chemistry is an intensely sequential discipline. Students must master the material at an average level of understanding in the first semester course (general chemistry I) before they are allowed to attempt the second semester course (general chemistry II). The same is true for each of the first five semester courses in the sequence (general chemistry I, general chemistry II, organic chemistry I, organic chemistry II and physical chemistry I).

The fundamental concepts covered in general chemistry I and II include:
uncertainty in measurement, dimensional analysis, atomic and electronic structure, ionic and molecular formulas, nomenclature, stoichiometry, thermochemistry, bonding theories, valence shell electron pair repulsion theory, properties of gases, intermolecular forces, properties of solutions, kinetics, equilibrium, acid-base chemistry, oxidation-reduction chemistry, chemical thermodynamics and electrochemistry.

RELATED ITEM LEVEL 2

American Chemical Society (ACS) General Chemistry Test

Indicator Description:

All chemistry majors will be invited to take a nationally standardized test over general chemistry (written by the American Chemical Society Division of Chemical Education Examinations Institute) near their completion of general chemistry II. In order to encourage participation, the highest individual score is guaranteed scholarship money for a future semester, and additional scholarship monies will be scaled to percentile performance on the examination.

Note: We cannot legally reproduce these exams, but the normalization data is available and is attached (this is the 2006 ACS General Chemistry 2nd Term Form).

Attached Files

General-Chemistry-Brief-Year-Form-2006.pdf

Criterion Description:

Sixty percent of chemistry majors are expected to score within one standard deviation of the mean or higher than one standard deviation above the mean on the ACS standardized general chemistry examination. In past years, the major weakness has been the low number of majors who took the exam. We continue to work to motivate more students to take the exam since the biggest problem is the number of takers.

Findings Description:

In Fall 2022, the exam was not given. Due to an error, the Spring 2022 exam proctor went to the wrong room and the exam had to be rescheduled, likely reducing turnout. Two students took the exam, so we are not breaking them out by major (CHEM and FCHM)..

Of those two students, one scored 27/50 (52nd percentile) and one scored 30/50 (64th percentile).

The test national standardization mean was 28/50 with a standard deviation of 8, so one standard deviation below the mean was 20/50 (representing 20th percentile). Both students scored higher than this, so the criteria is technically met but with such low turnout that this measure likely doesn't mean that much.

RELATED ITEM LEVEL 3

Action - ACS Exams in a Later Course

Action Description:

As the turnout for the scholarship exam at the end of General Chemistry, which uses the standardized ACS exam, is too low, we will pilot giving tests to students at the beginning of CHEM 3438 Biochemistry I. CHEM 1411 and 1412 General Chemistry I & II are both pre-requisites for CHEM 3438 as are CHEM 2323, 2123, 2325, and 2125 Organic Chemistry I & II lecture and labs. All chemistry undergraduate majors take this course. The exams will be given at the beginning of CHEM 3438 in lab time.

This will produce a slightly different measurement, as students are expected to lose knowledge post-course but the measure of retention may be useful and this way we can capture all majors for comparison. For Organic Chemistry, we will be able to compare scores for the ACS exam given at the end of Organic II lecture and beginning of Biochemistry I.

RELATED ITEM LEVEL 1

Demonstrate Understanding Of Organic Chemistry

Learning Objective Description:

Organic chemistry is covered in the second year of a chemistry degree. It follows a year of general chemistry and precedes physical chemistry.

Students will demonstrate competent knowledge of the topics covered in organic chemistry I and II which include: hydrocarbons (alkanes, alkenes and alkynes), aromatic systems, functional group chemistry (including the chemistry of alkyl halides, ethers and various carbonyl compounds), stereochemistry, and carbohydrate chemistry.

RELATED ITEM LEVEL 2

ACS Organic Chemistry Test

Indicator Description:

A nationally standardized test over organic chemistry (written by the American Chemical Society Division of Chemical Education Examinations Institute) will be given to all chemistry majors who take organic chemistry II at Sam Houston State University. This test is given as the final examination for the course.

Criterion Description:

Seventy-five percent of chemistry majors are expected to score within one standard deviation of the mean or higher than one standard deviation above the national mean on the ACS standardized organic chemistry examination.

Note: We are not legally allowed to reproduce these exams, so a sample is not attached. However, the normalization data is available and is attached.

Attached Files

OR16_Norm_Sheet_Final_post.pdf

Findings Description:

The mean and standard deviation in the national norming data are 36.6 and 11.4, respectively, as noted in the attached Norm Sheet. Thus the criteria of scoring within one standard deviation of the mean requires a score of 25.2 or higher. A score of 26 corresponds to a percentile ranking of (bottom) 20th percentile. In Dr. Arney's class, 17 students took the ACS final exam and all but 2 met the criteria (88% met the criteria). The average score in his class was 38.5 correct, which corresponds to (interpolating) 58th percentile. In Dr. Hobbs' sections, the average number of correct answers was 30 (32nd percentile), 29 (29th percentile), and 26 (20th percentile) correct. In those sections 9/13 (69%), 16/20 (80%), and 12/24 (50%) exceeded 25.2 questions correct for a total of 37/57 (64.9%). All together for all sections, 52 out of 74 students exceeded 25.2 questions correct for 70.3% meeting the threshold. The criteria therefore was not met.

[Note: If the 25.2 threshold was rounded to 25, a slightly different outcome of 55/74 students scored 25 or higher as 3 students scored 25. This is 74.3% of students meeting the threshold with this alternate rounding, but is still slightly below the threshold).

The criteria was not met.

RELATED ITEM LEVEL 3

Action - ACS Exams in a Later Course

Action Description:

As the turnout for the scholarship exam at the end of General Chemistry, which uses the standardized ACS exam, is too low, we will pilot giving tests to students at the beginning of CHEM 3438 Biochemistry I. CHEM 1411 and 1412 General Chemistry I & II are both pre-requisites for CHEM 3438 as are CHEM 2323, 2123, 2325, and 2125 Organic Chemistry I & II lecture and labs. All chemistry undergraduate majors take this

course. The exams will be given at the beginning of CHEM 3438 in lab time.

This will produce a slightly different measurement, as students are expected to lose knowledge post-course but the measure of retention may be useful and this way we can capture all majors for comparison. For Organic Chemistry, we will be able to compare scores for the ACS exam given at the end of Organic II lecture and beginning of Biochemistry I.

RELATED ITEM LEVEL 3

Organic Chemistry Knowledge

Action Description:

Although the ACS Organic Exam results were borderline (failed to meet the criteria technically, but within rounding expectations), the measure of student ability to represent the chemical structure of a simple protein failed and it is believed based on interactions in later courses that students are not learning or retaining knowledge in the area sufficiently to handle content that builds on it. Therefore, we will increase the utilization of Organic Chemistry in in-class activities in the flipped course CHEM 3438 Biochemistry I. This will allow students to review Organic and practice it as part of that course, for which this knowledge is pre-requisite.

Deliver A Curriculum With Appropriate Written And Oral Communication Skills Developed

Goal Description:

The curriculum will provide opportunities for mastery of written and oral skills.

Providing Department: Chemistry BS

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Adequate Oral Communication

Learning Objective Description:

Students will demonstrate the ability to present to an audience of their peers a talk (seminar) based on their own research or research that has been reported in the scientific literature.

RELATED ITEM LEVEL 2

Chemistry Seminar Presentation

Indicator Description:

All chemistry majors are required to take CHEM 4100 "Chemical Literature Seminar". Students typically do so in their senior year. One of the requirements of this course is giving an oral PowerPoint presentation over either their own research, or research from the published chemical literature, to the other students in the class. As part of the Fall 2021 and Spring 2022 semesters students were tasked with completing a seminar topic form and include two supporting references and a reason why they were chosen.

Attached Files

Syllabus CHEM 4100 Spring 2022.pdf

Criterion Description:

Success was defined by submission of two supporting references by at least 80% of students and overall improvement in introductory and background slides as evaluated by the instructor.

Findings Description:

All students were required to submit topic selection forms with two supporting references. Over 95% of students (32/33) either included their supporting references in their seminar presentations or they found more relevant references to include. Therefore the criteria is met.

RELATED ITEM LEVEL 3

Action - Chemistry Seminar Presentation

Action Description:

The seminar topic selection forms will continue to be used, as they helped the student go beyond their selected research article and be able to present a broader background in their introductions. Moving forward separate forms will be created for those doing literature and research presentations.

RELATED ITEM LEVEL 1

Develop Effective Written Communication Skills

Learning Objective Description:

Students will learn to write effectively to a professional audience following accepted professional standards in the field.

These standards are best documented in the publication "The ACS Guide to Scholarly Communication" available at https://pubs.acs.org/doi/book/10.1021/acsguide.

RELATED ITEM LEVEL 2

Chemistry Majors Will Self-evaluate That Their Writing Has Improved as a Result of Their Writing-Enhanced Courses

Indicator Description:

A survey will be developed and sent to Chemistry majors (and others, but the results for this ICF will be filtered for just Chemistry majors) in which they will be asked to score whether they agree with the statement "Based on your writing enhanced chemistry courses, how much do you agree with each statement" followed by the statement "My writing has improved as a result of those courses.". The respondents will score their agreement from 0 (strongly disagree) to 100 (strongly agree).

Criterion Description:

At least 80% of Chemistry majors responding will give agree with a score of 51 or higher (since 51 would be minimal agreement).

Findings Description:

The survey findings for Chemistry Majors are attached. Of 9 Chemistry majors responding, 8 gave a score of 60 or higher and one gave a score of 50. That is 89% giving a score of 51 or higher which significantly exceeds the criteria.

Attached Files

CHEMwriting.pdf

RELATED ITEM LEVEL 2

Lab-Assistant Assessment of Student Writing Will Demonstrate Student Improvement to a Passing Level

Indicator Description:

In CHEM 3438W Biochemistry I Laboratory, which is writing-enhanced, students write multiple large 'Formal Reports' which are research reports written to an audience of professional scientists as well as 'Results and Discussion' sections that are drafts of these parts of the Formal Reports. Thus students turn in the Results and Discussion first, get feedback, and use this to build the much larger Formal Report. Writing artifacts are evaluated by the undergraduate and graduate lab assistants, who also provide the feedback.

The description of the Formal Report assignment excerpted from the lab manual is attached. A two-part picture of the rubric from Blackboard/Turn-it-In used by the lab assistants to evaluate the reports is also attached (the rubric cannot be exported as a text table to include here, unfortunately).

Attached Files

Report Pages from Biochemistry Lab Manual 2021-22.pdf

Rubric1.JPG

Rubric2.JPG

Criterion Description:

At least 90% of students will be evaluated to write an acceptable final Formal Report as indicated by a score of 70% or higher in the evaluation of the report.

Findings Description:

The results obtained for all majors in the course were:

Fall 2021

Section 11 - 8 out of 11 students scored 70% or higher (73% of students)

Section 12 - 14/16 (88%)

Section 13 - 14/15 (93%)

Section 14 - 12/13 (92%)

Spring 2022

Section 11 - 22/22 (100%)

Section 12 - 13/17 (76%)

Overall, 83 of 94 students scored 70% or higher, which is 88%. Therefore, the criteria was not quite met.

Evaluation of the papers that earned less than 70% suggests that the underlying problem is not a lack of writing skill as much as a lack of time invested. The writing portion of CHEM 3438 lab is an extremely high workload, and requires constant management. Between Fall 2021 and Spring 2022, the last formal report was changed from an individual assignment to a group assignment in order to reduce the workload (and help teach team skills).

This means the 4 grades in Spring 2022 that were below 70% were really one paper by four students earning 68% on their paper. With the number of students evaluated this means the assessment criteria needs to be re-evaluated if this is re-used as really the whole data set if all students were submitted as groups would just be around 25 papers, so each paper is around 4% of papers overall and around 25% of the papers in a give section and rounding to the nearest 1% for the criteria does not make sense. Therefore 88% is exactly at the criteria within reasonable rounding error.

In the classroom, additional thought into how to tweak the overall set of writing assignments to reduce workload and increase time students can put into the final formal report would be considered but a solution has not been found at this time.

RELATED ITEM LEVEL 2

Students Will Self-Assess That Their Writing Improved at the End of a Writing-Enhanced Course

Indicator Description:

In a post-course survey in the writing-enhanced course CHEM 3438W Biochemistry I taught by Dr. Haines, a question will ask students to self-evaluate whether they agree with the statement "My writing has improved as a result of taking this course". Their responses will be on a scale of 0 (disagree strongly) to 100 (agree strongly).

Criterion Description:

At least 80% of students responding will agree that their writing improved at a level of 51 or higher on the scale of 0-100.

Findings Description:

In Fall 2021, 36 students responded with an average response of 79 +/- 21. All but 3 student responded with a 51 or higher, with 12 rating it at 100.

In Spring 2022, 18 students responded with an average score of 65 +/-39. All but 3 responded with a 51 or higher, with 6 rating it at 100.

Overall, then, 48/54 students rate that they agreed that their writing improved at a level of 51 or higher, 89% of students responding. This exceeds the criteria of 80%, the criteria is met.

Data for both semesters in the form of Qualtrics report PDFs is attached.

Although the criteria is met, the apparent lower score may be significant given that more writing was moved to group writing in Spring 2022 versus Fall 2021. That reduced workload that was straining students, but at the expense of less writing for each student and less feedback on their individual writing, so this decrease is not unexpected but is contrary to the goal of improving writing. At this time a solution that both reduces workload and increases writing development is not apparent, but more thought will be put into how to manage these competing goals.

Attached Files

Fall 2021 CHEM3438 Writing Self-assessment.pdf

Spring 2022 CHEM3438 Writing Self-assessment.pdf

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

The plan for the coming year is dominated by the return to 'normal' courses (assuming that continues to be the plan despite the current huge spike in COVID cases). Although it would seem returning to normal would be easier, COVID heavily disrupted teaching styles and courses for the coming year will be taught using some of the tools generated during COVID-alterations, so in a way this means we will be teaching in the four format in under two years (old normal, pure online/remote, hybrid, new normal) and are doing so under a new schedule (fall starts earlier than ever and starts on a Monday not a Wednesday) than we have in the past.

Specific things to be done to improve:

- Return to using the standardized ACS organic exam, which must be taken in-person. This will give us valuable comparative data to pre-COVID student performance.
- Better advertise and communicate about the benefits of taking the ACS General Chemistry exam to increase the fraction of eligible students that take it
- Increase student writing in CHEM 3438 to further improve skill development for writing professional research reports according to professional standards
- Navigate the return to 'normal' courses during a completely abnormal time. Extensive accommodations will still be necessary for students who are quarantined or isolated due to COVID, and campus-wide policies were still changing as the semester started.
- Assess the major problems resulting from COVID-disruptions that will continue to plague us even if COVID-disruptions in attendance immediately stopped. For example, some of our transfer students now come in with a transcript that says they have two years worth of chemistry (CHEM 1411, 1412, 2323+2123, 2325+2125) but when advised indicate that they have never been in a lab or handled chemicals before. This creates a major safety and skill-deficit issue. It is unclear how to solve this while simultaneously moving forward with normal class loads that take 110% of faculty and staff time, but solutions (internal and external, for example the American Chemical Society is working on providing small workshop materials to help solve this problem) must be explored.
- Improve lab assistant expertise. The students in the previous pool are also our pool of lab assistants to supervise students working with hazardous chemicals in the lab. We have also failed to secure budget increases to increase pay for our students workers, even though most competing jobs have increases pay over the years, and as a result our number of applicants has not kept pace with our increased number of lab sections and we have had to use lab assistants with extremely low qualifications to fill positions (for example, they may have taken the lab they supervise only one semester before and earned a C). Since budget increases to increase pay have been systematically denied, one of the few strategies available on the department side is to try to increase communications. [Note: This is complicated a great deal by the fact that Fall 2021 will start earlier than we have ever started before and starts on a Monday, so assignments will be needed earlier than ever before.]

Update of Progress to the Previous Cycle's PCI:

The year ended up being a partial return to normal, but with challenges posed by COVID disruptions that will reverberate for years to come.

For the specific things to be done to improve:

- Return to using the standardized ACS organic exam, which must be taken in-person. This will give us valuable comparative data to pre-COVID student performance.
  - This was accomplished.
- Better advertise and communicate about the benefits of taking the ACS General Chemistry exam to increase the fraction of eligible students that take it
  - Although it was planned and communicated better in Spring 2022, an error (the wrong room number was given to a proctor) disrupted the exam.
  - We will start testing with this exam in CHEM 3438 to catch more majors, though at a later step of the degree.
  - The scholarship exam will continue, but we will need to continue to improve logistics of getting students in to take it.
- Increase student writing in CHEM 3438 to further improve skill development for writing professional research reports according to professional standards
  - Because of concerns about workload based on constant student feedback, we actually reduced the amount of individual student writing (but not number of assignments, just more were group assignments). This may be impacting student writing development in a negative way, but at this time appears to be necessary for student mental health.
- Navigate the return to 'normal' courses during a completely abnormal time. Extensive accommodations will still be necessary for students who are quarantined or isolated due to COVID, and campus-wide policies were still changing as the semester started.
  - Although there were minor issues here and there, overall instructors did an excellent job navigating the transition from pandemic-high-flexibility to a post-pandemic-lower-flexibility mode of teaching. Accommodations were made were needed, but not to the extent that students circumvented features of courses designed to help them learn content.
- Assess the major problems resulting from COVID-disruptions that will continue to plague us even if COVID-disruptions in attendance immediately stopped. For example, some of our transfer students now come in with a transcript that says they have two years worth of chemistry (CHEM 1411, 1412, 2323+2123, 2325+2125) but when advised indicate that they have never been in a lab or handled chemicals before. This creates a major safety and skill-deficit issue. It is unclear how to solve this while simultaneously moving forward with normal class loads that take 110% of faculty and staff time, but solutions (internal and external, for example the American Chemical Society is working on providing small workshop materials to help solve this problem) must be explored.
  - This will remain an issue for some time. We did not implement the ACS min-workshop, which was very limited in scope. Lab instructors are aware of the low-experience problem for incoming students and for our lab assistants.

- Improve lab assistant expertise. The students in the previous pool are also our pool of lab assistants to supervise students working with hazardous chemicals in the lab. We have also failed to secure budget increases to increase pay for our students workers, even though most competing jobs have increases pay over the years, and as a result our number of applicants has not kept pace with our increased number of lab sections and we have had to use lab assistants with extremely low qualifications to fill positions (for example, they may have taken the lab they supervise only one semester before and earned a C). Since budget increases to increase pay have been systematically denied, one of the few strategies available on the department side is to try to increase communications. [Note: This is complicated a great deal by the fact that Fall 2021 will start earlier than we have ever started before and starts on a Monday, so assignments will be needed earlier than ever before.]
    - This issue has gotten much more complicated as pay for competing jobs increased since last year, but the university has not approved budget requests to raise student worker pay about $8/hr. The result is that we are extremely stretched in our teaching pool. For summer 2022, for example, nearly 1/3rd of lab sections are being direct-instructed by a staff instructor due to low number of applications for student workers in the summer.
    - We did reach out to a much wider audience of potential workers, sending applications for Fall 2021 and Spring 2022 to all students that had a chemistry course in the previous year. This offset application loss somewhat, but not completely.

New Plan for Continuous Improvement (BS Chem)

Closing Summary:

This year represented a partial return to normal, and allowed a better perspective to see the aftermath of COVID and what challenges will linger form the limits of teaching during the pandemic.

- A specific area to target for improvement is student knowledge of Organic Chemistry. Sophomore-level Organic Chemistry (CHEM 2323/2123/2325/2125) is widely held to be the most difficult set of courses in college regardless of major, so a challenge for it is not new. To increase student knowledge and retention and better measure it we will
    - Start giving American Chemical Society Organic Chemistry standardized exams at the start of CHEM 3438 Biochemistry I during lab time, to measure knowledge that is pre-requisite to that course. [Carried out by Dr. Donovan Haines.]
    - Spend more time during in-class activities in CHEM 3438 Biochemistry I lecture on practicing writing organic structures and using organic concepts. These concepts are very central to Biochemistry I, and already activity-based assignments exist that involve peptide and metabolite structure. These will be expanded to increase practice and discussion (class time in the course is largely discussion and practice, it is a flipped format where content presentation happens outside of class time). [Carried out by Dr. Donovan Haines]
- Our assessment of General Chemistry knowledge didn't work very well, but success rates in the General Chemistry courses have separately been observed to be quite low. To address these issues, we will
    - Start giving American Chemical Society General Chemistry standardized exams at the start of CHEM 3438 Biochemistry I during lab time, to measure knowledge that is pre-requisite to that course. [Carried out by Dr. Donovan Haines.]
    - As part of a Provost and COSET Dean's Office initiative, a working group was formed to address low CHEM 1411 and 1412 success (grades of C or higher) rates. These efforts are leading to a lot of additional student supports being developed for Fall 2022 (primarily for the first step, CHEM 1411), ranging from mentored study groups to learning frameworks (study skills etc.) presentations during lab time the first two weeks of classes, and additional advisor and instructor resources being developed to support student success. This effort will also produced detailed success data, some of which was generated Fall 2021 but the full extended dataset will be produced in Summer 2022. [This is carried out by a team composed of chemistry personnel Dr. Adrian Villalta-Cerdas, Dr. Dustin Gross, Dr. Christopher Zall, Dr. David Thompson, Steve Hegwood, and Dr. Donovan Haines along with input from the entire chemistry faculty and staff and collaboration/coordination with the Academic Success Center led by Dr. Mary Catharine Breen, the STEM Center led by Dr. Taylor Martin, and the COSET Dean's Office led by Associate Deans Dr. Melinda Holt and Dr. Li-Jen Lester along with input from the campus PACE Center.]
- We always strive to improve writing and presentation skills. Although all criteria were met in these areas, we will continue to
    - Improve undergraduate seminar (CHEM 4100) by honing the research topic selection process to help student broaden their background. [Dr. Dustin Gross]
    - Collect more specific feedback from students about how to balance the excessive workload that comes with a high level of writing practice with the low level of writing improvement that comes with a low level of writing practice. We will interview teaching assistants of CHEM 3438 and ask students about this specific issue on post-course surveys for the course in the coming year. [Dr. Donovan Haines]

Forensic Chemistry BS

Deliver A Curriculum Appropriate For Mastery Of Advanced Chemistry Topics

Goal Description:

The curriculum will provide students with opportunities to develop the skills typically required of professionals in the area of advanced chemistry topics. These topics, which include Physical Chemistry and Instrumental Analytical Chemistry, can only be understood after at least four semesters of undergraduate chemistry coursework and in some cases Calculus I, Calculus II, and a year of Physics with laboratory (all with C's or higher).

Attached Files

2015-acs-guidelines-for-bachelors-degree-programs.pdf

Providing Department: Forensic Chemistry BS

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Mastery Of Physical Chemistry

Learning Objective Description:

The material learned by the third year in the chemistry curriculum is refined and supported theoretically in Physical Chemistry I (CHEM 4448). The successful student will demonstrate a mastery of the advanced topics presented in this course. These topics include quantum theory, wave functions, the dipole approximation, electronic configuration, molecular structure, molecular orbital diagrams, symmetry, group theory, and the application of these topics to X-ray, ultraviolet, visible, infrared, Raman, and magnetic resonance spectroscopy. All sections of CHEM 4448 have been taught by Dr. Darren Williams since his arrival at SHSU in 2004.

RELATED ITEM LEVEL 2

CHEM 4448 Final Examination

Indicator Description:

CHEM 4448 is required of all chemistry majors. The final examination in Physical Chemistry I (CHEM 4448), written by Dr. Darren Williams, is recognized by the faculty of the Department of Chemistry as being comprehensive and covers all of the advanced topics listed in the objective statement. Dr. Williams is the sole instructor of CHEM 4448 at SHSU having taught all sections of CHEM 4448 since his arrival on campus in 2004. All students are required to complete the final examination. Examples of final exams are on file and secured within the Department of Chemistry and may be viewed by contacting Dr. Williams directly at williams@shsu.edu.

Criterion Description:

Seventy-five percent of chemistry majors are expected to demonstrate a mastery of at least sixty percent of the material (score 60%) on the comprehensive final examination.

Findings Description:

33/38 students (87%) scored at least 60% on the comprehensive exam, which exceeds the criteria of 75% of students. The criteria is met/exceeded.

RELATED ITEM LEVEL 1

Demonstrate Understanding Of Instrumental Analytical Methods In Chemistry

Learning Objective Description:

The modern analytical laboratory makes extensive use of electronic instrumentation for the analysis of chemical samples. Our Instrumental Analytical Chemistry course (CHEM 4440) is designed to introduce students to and have them learn the importance and use of spectrophotometric, chromatographic, and mass spectrometric analytical instrumental methods and computers in analytical laboratories. The course's laboratory component includes a focus on complex technical writing and use of the scientific literature. Students must master this material to meet the objective.

RELATED ITEM LEVEL 2

Examinations In Instrumental Analytical Chemistry

Indicator Description:

All students in Instrumental Analytical Chemistry (CHEM 4440) are required to master the electronic, sampling, schematic, and computational fundamentals of modern analytical instrumentation as evaluated by 80-minute written tests requiring essays, laboratory data evaluation, and calculator-based computation. There are three tests and a final examination in this course. The testing of this knowledge and its application is standardized within the department across all sections.

Criterion Description:

Eighty two and one half percent of chemistry majors are expected to score within one standard deviation of the mean or higher than one standard deviation above the mean on the four examinations in this class. We expect statistical variability from test to test and from year to year.

Findings Description:

The averages and standard deviations of the four exams were:

Exam 1: 95.6 +/- 13.1 (so one std dev below the mean was 82.5, 33 out of 36 exceeded so 91.7% exceeded with meets criteria)

Exam 2: 80.1 +/- 9.4 (70.7, all 36 students exceeded this so the criteria is met)

[Exam 3 was not given]

Final Exam: 97.6 +/- 18.5 (79.1, 30 of 35 students exceeded so 86% which meets criteria)

For all three exams given, the criteria was met, so the overall criteria is met.

RELATED ITEM LEVEL 1

Demonstrate Understanding of Biochemistry

Learning Objective Description:

Biochemistry is basically the study of the chemistry of living things. Fundamental knowledge in Biochemistry (as taught in the required first semester course) includes understanding the differences between the various classes of biological molecules, understanding the structure and function of proteins (especially enzymes), understanding how enzymes catalyze chemical reactions and how they are regulated. Students should also understand how the molecules of biochemistry are studied.

RELATED ITEM LEVEL 2

Students Can Accurately Represent The Structure Of A Simple Protein

Indicator Description:

Students who understand biochemistry and specifically protein structure should be able to draw an accurate chemical structure of a peptide given a sequence. This will be measured by asking the following question (the sequence given may change in different semesters) on the final exam of CHEM 3438 sections:

"Your friend in class are so happy to be finished that they decide to get a tattoo of the peptide FINISHED on their back. They have asked you to draw the structure of the peptide correctly as it would exist at pH 7.4 (showing all the correct ionization states). Please do so below, and remember, your friend will have this tattoo pretty much forever, so please get it right. (Note: You may use the back of the page for more space if needed, and feel free to draw a dangling bond on the right side of the page and continue the structure on another line if it helps.)"

Note: "FINISHED" is the amino acid sequence (using one-letter amino acid abbreviations) for the peptide they are asked to draw.

Criterion Description:

The question will be scored out of six points. The criteria will be met if at least 80% of students score at least 5/6 on the question, which is scored by the instructor of record. Points are deducted for having wrong termini or backbone (3 points, students are warned in class this is considered a major error on this kind of question), wrong amino acid side-chains (credit/deduction varies by how different the answer is from the correct structure), and for showing the correct structure in the wrong ionization state for the stated pH (1 pt).

Findings Description:

In fall 2021 in CHEM 3438.02 the question was given to 32 students with the following results:

6/6	8 students
5/6	7 students
4/6	4 students
3/6	4 students
2/6	2 students
1/6	6 students
0/6	1 student

Since 15/32 students scored 5/6 or higher which is 47% of students, this was well below the 80% criterion and the criterion was not met. The question was not used in Spring 2022.

The criteria is not met. Learning peptide structure depends heavily on prerequisite knowledge from Organic Chemistry and some from General Chemistry. In classroom discussions, it is apparent that students are remembering surprisingly little from their prerequisite courses, and that is likely contributing. In the future, a better attempt to measure that knowledge and hone it in class through discussions and assignments will be made.

RELATED ITEM LEVEL 3

Organic Chemistry Knowledge

Action Description:

Although the ACS Organic Exam results were borderline (failed to meet the criteria technically, but within rounding expectations), the measure of student ability to represent the chemical structure of a simple protein failed and it is believed based on interactions in later courses that students are not learning or retaining knowledge in the area sufficiently to handle content that builds on it. Therefore, we will increase the utilization of Organic Chemistry in in-class activities in the flipped course CHEM 3438 Biochemistry I. This will allow students to review Organic and practice it as part of that course, for which this knowledge is pre-requisite.

RELATED ITEM LEVEL 2

Students Can Explain What An Enzyme Is And How It Works

Indicator Description:

Students who demonstrate an understanding of biochemistry, and more specifically the nature of enzymes, will be able to answer the question "Explain what an enzyme is and how it works to a student finishing Organic Chemistry II class." This question will be asked on the final exam in a section of CHEM 3438 Biochemistry I as a free-response question.

Criterion Description:

The question will be scored out of four points. If at least 90% of students (set high as this knowledge is very fundamental to understanding of biochemistry) can achieve a score of at least three out of four points on the question, than the criterion has been met.

Findings Description:

Out of 32 exams in CHEM 3438.02 in Fall 2021, 28 scored 4/4, 3 scored 3/4, and 1 scored 1/4. Based on these results, 97% of students could answer the question correctly (as defined by getting at least 3/4) and the criterion is met. The question was not asked again in Spring 2022.

[Note: Unlike the peptide structure question used in another indicator/criterion/findings, this question does not depend very deeply on pre-requisite knowledge other than a basic understanding of what a catalyst is. This likely explains why the other question failed by a significant margin and this question succeeded by a wide margin.]

RELATED ITEM LEVEL 2

Students Will Self-Report That They Learned A Lot in CHEM 3438 Biochemistry I

Indicator Description:

As a complement to exam question assessments, students will be asked to self-assess how much they learned in CHEM 3438 Biochemistry I on a post-course Qualtrics survey. The survey instrument is given to students at the end of the semester (distributed approximately one week before the last day of class).

Students are asked to evaluate "On a scale of 1 to 100, how much do you agree with each statement" and a statement "I learned a lot this semester." is rated. The question defaults to a neutral score of 50.

Criterion Description:

If 80% of students give an agreement rating of 75% or more, this will be deemed successful.

Findings Description:

Of the 32 students in fall CHEM 3438.02 Biochemistry I, 16 responded to the survey. Here are the responses:

Rating	Number of Students
100	10
94	1
93	1
90	1
86	1
80	1
79	1

As can be seen, 100% of responding students agreed at a score of 75 or higher, exceeding the criteria. Ten students (63%) gave a perfect rating of 100.

The survey results from Spring 2022 are attached as a PDF file. In the spring semester, 25/28 people agreed at a level of 75 or higher (89%) with 17 of the students (612) giving a perfect rating of 100. The lowest score was 50, followed by 71 as the second-lowest.

Overall, then, 41/44 students agreed at a level of 75 or higher, which is 93%. This greatly exceeds the criteria of 80% so the criteria is met.

Attached Files

CHEM3438 Spring 2022 Learning Self-Assessment.pdf

Deliver A Curriculum Appropriate For Understanding Basic Chemistry

Goal Description:

Deliver an education in foundational and organic in-depth coursework (chemistry coursework from the first half of a BS degree) that provides knowledge and skills aligned with professional expectations, for example those described in the attached American Chemical Society Guidelines for Bachelors Degree Programs for chemistry programs in general.

Attached Files

2015-acs-guidelines-for-bachelors-degree-programs.pdf

Providing Department: Forensic Chemistry BS

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Understanding Of Chemistry Fundamentals

Learning Objective Description:

Chemistry is an intensely sequential discipline. Students must master the material at an average level of understanding in the first semester course (general chemistry I) before they are allowed to attempt the second semester course (general chemistry II). The same is true for each of the first five semester courses in the sequence (general chemistry I, general chemistry II, organic chemistry I, organic chemistry II and physical chemistry I).

The fundamental concepts covered in general chemistry I and II include:
uncertainty in measurement, dimensional analysis, atomic and electronic structure, ionic and molecular formulas, nomenclature, stoichiometry, thermochemistry, bonding theories, valence shell electron pair repulsion theory, properties of gases, intermolecular forces, properties of solutions, kinetics, equilibrium, acid-base chemistry, oxidation-reduction chemistry, chemical thermodynamics and electrochemistry.

RELATED ITEM LEVEL 2

American Chemical Society (ACS) General Chemistry Test

Indicator Description:

All forensic chemistry majors will be invited to take a nationally standardized test over general chemistry (written by the American Chemical Society Division of Chemical Education Examinations Institute) near their completion of general chemistry II. In order to encourage participation, the highest individual score is guaranteed scholarship money for a future semester, and additional scholarship monies will be scaled to percentile performance on the examination.

Note: We cannot legally reproduce these exams, but the normalization data is available and is attached (this is the 2006 ACS General Chemistry 2nd Term Form).

Attached Files

General-Chemistry-Brief-Year-Form-2006.pdf

Criterion Description:

Sixty percent of forensic chemistry majors are expected to score within one standard deviation of the mean or higher than one standard deviation above the mean on the ACS standardized general chemistry exam. In past years, the major weakness has been the low number of majors who took the exam. We continue to work to motivate more students to take the exam since the biggest problem is the number of takers.

Findings Description:

In Fall 2022, the exam was not given. Due to an error, the Spring 2022 exam proctor went to the wrong room and the exam had to be rescheduled, likely reducing turnout. Two students took the exam, so we are not breaking them out by major (CHEM and FCHM).

Of those two students, one scored 27/50 (52nd percentile) and one scored 30/50 (64th percentile).

The test national standardization mean was 28/50 with a standard deviation of 8, so one standard deviation below the mean was 20/50 (representing 20th percentile). Both students scored higher than this, so the criteria is technically met but with such low turnout that this measure likely doesn't mean that much.

RELATED ITEM LEVEL 3

Action - ACS Exams in a Later Course

Action Description:

As the turnout for the scholarship exam at the end of General Chemistry, which uses the standardized ACS exam, is too low, we will pilot giving tests to students at the beginning of CHEM 3438 Biochemistry I. CHEM 1411 and 1412 General Chemistry I & II are both pre-requisites for CHEM 3438 as are CHEM 2323, 2123, 2325, and 2125 Organic Chemistry I & II lecture and labs. All chemistry undergraduate majors take this course. The exams will be given at the beginning of CHEM 3438 in lab time.

This will produce a slightly different measurement, as students are expected to lose knowledge post-course but the measure of retention may be useful and this way we can capture all majors for comparison. For Organic Chemistry, we will be able to compare scores for the ACS exam given at the end of Organic II lecture and beginning of Biochemistry I.

RELATED ITEM LEVEL 1

Demonstrate Understanding Of Organic Chemistry

Learning Objective Description:

Organic chemistry is covered in the second year of a chemistry degree. It follows a year of general chemistry and precedes physical chemistry.

Students will demonstrate competent knowledge of the topics covered in organic chemistry I and II which include: hydrocarbons (alkanes, alkenes and alkynes), aromatic systems, functional group chemistry (including the chemistry of alkyl halides, ethers and various carbonyl compounds), stereochemistry, and carbohydrate chemistry.

RELATED ITEM LEVEL 2

American Chemical Society (ACS) Organic Chemistry Test

Indicator Description:

A nationally standardized test over organic chemistry (written by the American Chemical Society Division of Chemical Education Examinations Institute) will be given to all chemistry majors who take organic chemistry II at Sam Houston State University. This test is given as the final examination for the course.

Note: We are not legally allowed to reproduce these exams, so a sample is not attached. However, the normalization data is available and is attached.

Attached Files

OR16_Norm_Sheet_Final_post.pdf

Criterion Description:

Seventy-five percent of chemistry majors are expected to score within one standard deviation of the mean or higher than one standard deviation above the mean on the ACS standardized organic chemistry examination. We will closely follow the performance of forensic chemistry majors who scored slightly lower than chemistry majors in 2010-2011.

Findings Description:

The mean and standard deviation in the national norming data are 36.6 and 11.4, respectively, as noted in the attached Norm Sheet. Thus the criteria of scoring within one standard deviation of the mean requires a score of 25.2 or higher. A score of 26 corresponds to a percentile ranking of (bottom) 20th percentile. In Dr. Arney's class, 17 students took the ACS final exam and all but 2 met the criteria (88% met the criteria). The average score in his class was 38.5 correct, which corresponds to (interpolating) 58th percentile. In Dr. Hobbs' sections, the average number of correct answers was 30 (32nd percentile), 29 (29th percentile), and 26 (20th percentile) correct. In those sections 9/13 (69%), 16/20 (80%), and 12/24 (50%) exceeded 25.2 questions correct for a total of 37/57 (64.9%). All together for all sections, 52 out of 74 students exceeded 25.2 questions correct for 70.3% meeting the threshold. The criteria therefore was not met.

[Note: If the 25.2 threshold was rounded to 25, a slightly different outcome of 55/74 students scored 25 or higher as 3 students scored 25. This is 74.3% of students meeting the threshold with this alternate rounding, but is still slightly below the threshold).

The criteria was not met.

RELATED ITEM LEVEL 3

Action - ACS Exams in a Later Course

Action Description:

As the turnout for the scholarship exam at the end of General Chemistry, which uses the standardized ACS exam, is too low, we will pilot giving tests to students at the beginning of CHEM 3438 Biochemistry I. CHEM 1411 and 1412 General Chemistry I & II are both pre-requisites for CHEM 3438 as are CHEM 2323, 2123, 2325, and 2125 Organic Chemistry I & II lecture and labs. All chemistry undergraduate majors take this course. The exams will be given at the beginning of CHEM 3438 in lab time.

This will produce a slightly different measurement, as students are expected to lose knowledge post-course but the measure of retention may be useful and this way we can capture all majors for comparison. For Organic Chemistry, we will be able to compare scores for the ACS exam given at the end of Organic II lecture and beginning of Biochemistry I.

RELATED ITEM LEVEL 3

Organic Chemistry Knowledge

Action Description:

Although the ACS Organic Exam results were borderline (failed to meet the criteria technically, but within rounding expectations), the measure of student ability to represent the chemical structure of a simple protein failed and it is believed based on interactions in later courses that students are not learning or retaining knowledge in the area sufficiently to handle content that builds on it. Therefore, we will increase the utilization of Organic Chemistry in in-class activities in the flipped course CHEM 3438 Biochemistry I. This will allow students to review Organic and practice it as part of that course, for which this knowledge is pre-requisite.

Deliver A Curriculum With Appropriate Written And Oral Communication Skills Developed

Goal Description:

The curriculum will provide opportunities for mastery of written and oral skills.

Providing Department: Forensic Chemistry BS

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Adequate Oral Communication

Learning Objective Description:

Students will demonstrate the ability to present to an audience of their peers a talk (seminar) based on their own research or research that has been reported in the scientific literature

RELATED ITEM LEVEL 2

Chemistry Seminar Presentation

Indicator Description:

All chemistry majors are required to take CHEM 4100 "Chemical Literature Seminar". Students typically do so in their senior year. One of the requirements of this course is giving an oral PowerPoint presentation over either their own research, or research from the published chemical literature, to the other students in the class. As part of the Fall 2021 and Spring 2022 semesters students were tasked with completing a seminar topic form and include two supporting references and a reason why they were chosen.

Criterion Description:

Success was defined by submission of two supporting references and overall improvement in introductory and background slides and overall improvement in introductory and background slides as evaluated by the instructor..

Attached Files

4100.01

Findings Description:

All students were required to submit topic selection forms with two supporting references. Over 95% of students (32/33) either included their supporting references in their seminar presentations or they found more relevant references to include. Therefore the criteria is met.

RELATED ITEM LEVEL 3

Action - Chemistry Seminar Presentation

Action Description:

The seminar topic selection forms will continue to be used, as they helped the student go beyond their selected research article and be able to present a broader background in their introductions. Moving forward separate forms will be created for those doing literature and research presentations.

RELATED ITEM LEVEL 1

Develop Effective Written Communication Skills

Learning Objective Description:

Students will learn to write effectively to a professional audience following accepted professional standards in the field.

These standards are best documented in the publication "The ACS Guide to Scholarly Communication" available at https://pubs.acs.org/doi/book/10.1021/acsguide.

RELATED ITEM LEVEL 2

Forensic Chemistry Majors Will Self-evaluate That Their Writing Has Improved as a Result of Their Writing-Enhanced Courses

Indicator Description:

A survey will be developed and sent to Forensic Chemistry majors (and others, but the results for this ICF will be filtered for just Chemistry majors) in which they will be asked to score whether they agree with the statement "Based on your writing enhanced chemistry courses, how much do you agree with each statement" followed by the statement "My writing has improved as a result of those courses.". The respondents will score their agreement from 0 (strongly disagree) to 100 (strongly agree).

Criterion Description:

At least 80% of Forensic Chemistry majors responding will give agree with a score of 51 or higher (since 51 would be minimal agreement).

Findings Description:
Results for Forensic Chemistry majors are attached. Of the 9 Forensic Chemistry majors responding, the minimum score was 75 with 100% scoring the question at 51 or higher. Perfect scores of 100 were reported by 4 of the 9 students, just under half. The criteria was significantly exceeded.

Attached Files
FCHMWriting.pdf

RELATED ITEM LEVEL 2

Lab-Assistant Assessment of Student Writing Will Demonstrate Student Improvement
Indicator Description:
In CHEM 3438W Biochemistry I Laboratory, which is writing-enhanced, students write multiple large 'Formal Reports' which are research reports written to an audience of professional scientists as well as 'Results and Discussion' sections that are drafts of these parts of the Formal Reports. Thus students turn in the Results and Discussion first, get feedback, and use this to build the much larger Formal Report. Writing artifacts are evaluated by the undergraduate and graduate lab assistants, who also provide the feedback.

The description of the Formal Report assignment excerpted from the lab manual is attached. A two-part picture of the rubric from Blackboard/Turn-it-In used by the lab assistants to evaluate the reports is also attached (the rubric cannot be exported as a text table to include here, unfortunately).

Attached Files
Report Pages from Biochemistry Lab Manual 2021-22.pdf
Rubric1.JPG
Rubric2.JPG
Criterion Description:
At least 90% of students will be evaluated to write an acceptable final Formal Report as indicated by a score of 70% or higher in the evaluation of the report.

Findings Description:
The results obtained for all majors in the course were:

Fall 2021

Section 11 - 8 out of 11 students scored 70% or higher (73% of students)

Section 12 - 14/16 (88%)

Section 13 - 14/15 (93%)

Section 14 - 12/13 (92%)

Spring 2022

Section 11 - 22/22 (100%)

Section 12 - 13/17 (76%)

Overall, 83 of 94 students scored 70% or higher, which is 88%. Therefore, the criteria was not quite met.

Evaluation of the papers that earned less than 70% suggests that the underlying problem is not a lack of writing skill as much as a lack of time invested. The writing portion of CHEM 3438 lab is an extremely high workload, and requires constant management. Between Fall 2021 and Spring 2022, the last formal report was changed from an individual assignment to a group assignment in order to reduce the workload (and help teach team skills).

This means the 4 grades in Spring 2022 that were below 70% were really one paper by four students earning 68% on their paper. With the number of students evaluated this means the assessment criteria needs to be re-evaluated if this is re-used as really the whole data set if all students were submitted as groups would just be around 25 papers, so each paper is around 4% of papers overall and around 25% of the papers in a give section and rounding to the nearest 1% for the criteria does not make sense. Therefore 88% is exactly at the criteria within reasonable rounding error.

In the classroom, additional thought into how to tweak the overall set of writing assignments to reduce workload and increase time students can put into the final formal report would be considered but a solution has not been found at this time.

Update to Previous Cycle's Plan for Continuous Improvement Item

Previous Cycle's Plan For Continuous Improvement (Do Not Modify):
Closing Summary
The plan for the coming year is dominated by the return to 'normal' courses (assuming that continues to be the plan despite the current huge spike in COVID cases). Although it would seem returning to normal would be easier, COVID heavily disrupted teaching styles and courses for the coming year will be taught using some of the tools generated during COVID-alterations, so in a way this means we will be teaching in the four format in under two years (old normal, pure online/remote, hybrid, new normal) and are doing so under a new schedule (fall starts earlier than ever and starts on a Monday not a Wednesday) than we have in the past.

Specific things to be done to improve:

- Return to using the standardized ACS organic exam, which must be taken in-person. This will give us valuable comparative data to pre-COVID student performance.
- Better advertise and communicate about the benefits of taking the ACS General Chemistry exam to increase the fraction of eligible students that take it
- Increase student writing in CHEM 3438 to further improve skill development for writing professional research reports according to professional standards

- Navigate the return to 'normal' courses during a completely abnormal time. Extensive accommodations will still be necessary for students who are quarantined or isolated due to COVID, and campus-wide policies were still changing as the semester started.
- Assess the major problems resulting from COVID-disruptions that will continue to plague us even if COVID-disruptions in attendance immediately stopped. For example, some of our transfer students now come in with a transcript that says they have two years worth of chemistry (CHEM 1411, 1412, 2323+2123, 2325+2125) but when advised indicate that they have never been in a lab or handled chemicals before. This creates a major safety and skill-deficit issue. It is unclear how to solve this while simultaneously moving forward with normal class loads that take 110% of faculty and staff time, but solutions (internal and external, for example the American Chemical Society is working on providing small workshop materials to help solve this problem) must be explored.
- Improve lab assistant expertise. The students in the previous pool are also our pool of lab assistants to supervise students working with hazardous chemicals in the lab. We have also failed to secure budget increases to increase pay for our students workers, even though most competing jobs have increases pay over the years, and as a result our number of applicants has not kept pace with our increased number of lab sections and we have had to use lab assistants with extremely low qualifications to fill positions (for example, they may have taken the lab they supervise only one semester before and earned a C). Since budget increases to increase pay have been systematically denied, one of the few strategies available on the department side is to try to increase communications. [Note: This is complicated a great deal by the fact that Fall 2021 will start earlier than we have ever started before and starts on a Monday, so assignments will be needed earlier than ever before.]

Update of Progress to the Previous Cycle's PCI:
The year ended up being a partial return to normal, but with challenges posed by COVID disruptions that will reverberate for years to come.

For the specific things to be done to improve:

- Return to using the standardized ACS organic exam, which must be taken in-person. This will give us valuable comparative data to pre-COVID student performance.
  - This was accomplished.
- Better advertise and communicate about the benefits of taking the ACS General Chemistry exam to increase the fraction of eligible students that take it
  - Although it was planned and communicated better in Spring 2022, an error (the wrong room number was given to a proctor) disrupted the exam.
  - We will start testing with this exam in CHEM 3438 to catch more majors, though at a later step of the degree.
  - The scholarship exam will continue, but we will need to continue to improve logistics of getting students in to take it.
- Increase student writing in CHEM 3438 to further improve skill development for writing professional research reports according to professional standards
  - Because of concerns about workload based on constant student feedback, we actually reduced the amount of individual student writing (but not number of assignments, just more were group assignments). This may be impacting student writing development in a negative way, but at this time appears to be necessary for student mental health.
- Navigate the return to 'normal' courses during a completely abnormal time. Extensive accommodations will still be necessary for students who are quarantined or isolated due to COVID, and campus-wide policies were still changing as the semester started.
  - Although there were minor issues here and there, overall instructors did an excellent job navigating the transition from pandemic-high-flexibility to a post-pandemic-lower-flexibility mode of teaching. Accommodations were made were needed, but not to the extent that students circumvented features of courses designed to help them learn content.
- Assess the major problems resulting from COVID-disruptions that will continue to plague us even if COVID-disruptions in attendance immediately stopped. For example, some of our transfer students now come in with a transcript that says they have two years worth of chemistry (CHEM 1411, 1412, 2323+2123, 2325+2125) but when advised indicate that they have never been in a lab or handled chemicals before. This creates a major safety and skill-deficit issue. It is unclear how to solve this while simultaneously moving forward with normal class loads that take 110% of faculty and staff time, but solutions (internal and external, for example the American Chemical Society is working on providing small workshop materials to help solve this problem) must be explored.
  - This will remain an issue for some time. We did not implement the ACS min-workshop, which was very limited in scope. Lab instructors are aware of the low-experience problem for incoming students and for our lab assistants.
- Improve lab assistant expertise. The students in the previous pool are also our pool of lab assistants to supervise students working with hazardous chemicals in the lab. We have also failed to secure budget increases to increase pay for our students workers, even though most competing jobs have increases pay over the years, and as a result our number of applicants has not kept pace with our increased number of lab sections and we have had to use lab assistants with extremely low qualifications to fill positions (for example, they may have taken the lab they supervise only one semester before and earned a C). Since budget increases to increase pay have been systematically denied, one of the few strategies available on the department side is to try to increase communications. [Note: This is complicated a great deal by the fact that Fall 2021 will start earlier than we have ever started before and starts on a Monday, so assignments will be needed earlier than ever before.]
  - This issue has gotten much more complicated as pay for competing jobs increased since last year, but the university has not approved budget requests to raise student worker pay about $8/hr. The result is that we are extremely stretched in our teaching pool. For summer 2022, for example, nearly 1/3rd of lab sections are being direct-instructed by a staff instructor due to low number of applications for student workers in the summer.
  - We did reach out to a much wider audience of potential workers, sending applications for Fall 2021 and Spring 2022 to all students that had a chemistry course in the previous year. This offset application loss somewhat, but not completely.

New Plan for Continuous Improvement (BS Forensic Chem)

Closing Summary:
This year represented a partial return to normal, and allowed a better perspective to see the aftermath of COVID and what challenges will linger form the limits of teaching during the pandemic.

- A specific area to target for improvement is student knowledge of Organic Chemistry. Sophomore-level Organic Chemistry (CHEM 2323/2123/2325/2125) is widely held to be the most difficult set of courses in college regardless of major, so a challenge for it is not new. To increase student knowledge and retention and better measure it we will
  - Start giving American Chemical Society Organic Chemistry standardized exams at the start of CHEM 3438 Biochemistry I during lab time, to measure knowledge that is pre-requisite to that course. [Carried out by Dr. Donovan Haines.]
  - Spend more time during in-class activities in CHEM 3438 Biochemistry I lecture on practicing writing organic structures and using organic concepts. These concepts are very central to Biochemistry I, and already activity-based assignments exist that involve peptide and metabolite

structure. These will be expanded to increase practice and discussion (class time in the course is largely discussion and practice, it is a flipped format where content presentation happens outside of class time). [Carried out by Dr. Donovan Haines]

- Our assessment of General Chemistry knowledge didn't work very well, but success rates in the General Chemistry courses have separately been observed to be quite low. To address these issues, we will
  - Start giving American Chemical Society General Chemistry standardized exams at the start of CHEM 3438 Biochemistry I during lab time, to measure knowledge that is pre-requisite to that course. [Carried out by Dr. Donovan Haines.]
  - As part of a Provost and COSET Dean's Office initiative, a working group was formed to address low CHEM 1411 and 1412 success (grades of C or higher) rates. These efforts are leading to a lot of additional student supports being developed for Fall 2022 (primarily for the first step, CHEM 1411), ranging from mentored study groups to learning frameworks (study skills etc.) presentations during lab time the first two weeks of classes, and additional advisor and instructor resources being developed to support student success. This effort will also produced detailed success data, some of which was generated Fall 2021 but the full extended dataset will be produced in Summer 2022. [This is carried out by a team composed of chemistry personnel Dr. Adrian Villalta-Cerdas, Dr. Dustin Gross, Dr. Christopher Zall, Dr. David Thompson, Steve Hegwood, and Dr. Donovan Haines along with input from the entire chemistry faculty and staff and collaboration/coordination with the Academic Success Center led by Dr. Mary Catharine Breen, the STEM Center led by Dr. Taylor Martin, and the COSET Dean's Office led by Associate Deans Dr. Melinda Holt and Dr. Li-Jen Lester along with input from the campus PACE Center.]
- We always strive to improve writing and presentation skills. Although all criteria were met in these areas, we will continue to
  - Improve undergraduate seminar (CHEM 4100) by honing the research topic selection process to help student broaden their background. [Dr. Dustin Gross]
  - Collect more specific feedback from students about how to balance the excessive workload that comes with a high level of writing practice with the low level of writing improvement that comes with a low level of writing practice. We will interview teaching assistants of CHEM 3438 and ask students about this specific issue on post-course surveys for the course in the coming year. [Dr. Donovan Haines]

Department of Computer Science

Computing and Data Science MS

Technical Competence - To Develop And Demonstrate Knowledge Of Theoretical Materials, And Computational And Technical Skills

Goal Description:

Graduates with a master degree in Computing and Data Science will have a strong technical foundation, that is, to develop and demonstrate knowledge of theoretical materials, and computational and technical skills in the areas of Computing and Information Science.

Providing Department: Computing and Data Science MS

Progress: Ongoing

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Understand The Body Of Knowledge Of Computer Science And Information Technologies

Learning Objective Description:

Students will develop and demonstrate knowledge of theoretical materials, technical skills and project management relevant to computer information systems.

RELATED ITEM LEVEL 2

Written Comprehensive Examination

Indicator Description:

Each student is required to take and pass the written comprehensive examination (WCE) in the graduating semester. Passing grade is defined as scoring 70 or above out of 100, and high pass grade is defined as scoring 85 or above out of 100. Graduate faculty who teach the current 5 core courses of computing and information science are responsible to design exam questions. Each student is given one hour on each of the 5 subjects:

1. Database Systems
2. Programming Languages
3. Data Structures
4. Operating Systems
5. Software Engineering

Faculty who gave the exam questions are responsible to grade and report grades of these exams.

Criterion Description:

Graduate faculty who gave the exam questions are responsible for grading and reporting the grades to graduate advisor. Each exam score should be numeric number between 0 and 100, so that a fail (69 or below), pass (70-84), or high pass (85-100) can be determined.

Findings Description:

Fall 2021: One CDS student has taken four comprehensive exams (Operating Systems, Language and Compiler Design, Database Systems, Algorithm Design and Analysis) and passed all.

Spring 2022: Five CDS students have taken comprehensive exams, and all passed.

RELATED ITEM LEVEL 3

Written Comprehensive Examination

Action Description:

We aim for 100% success from the Comprehensive examinations along with "A"s or "B"s. Therefore, a comprehensive exam study guide will be shared with students who will need to take the exam, also courses will be geared more toward to research direction which will help students by reflecting the expectation from capstone projects.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

Exit survey is conducted and results will be shared in graduate curriculum committee meeting in Fall 2022.

The GCC will conduct multiple meetings during the Fall 2022 and Spring 2023 semesters to find and apply necessary changes to the program.

Update of Progress to the Previous Cycle's PCI:

COSC 5600 Internship's Form B was prepared by Drs. Cho, An, Zhou.

MS in CDS with a Professional Plan (course-based MS Degree) has been proposed.

Online Data Science Certificate program was proposed.

New Plan for Continuous Improvement Item

Closing Summary:

Exit survey is conducted and results will be shared in graduate curriculum committee meeting in Fall 2022.

The GCC will conduct multiple meetings during the Fall 2022 and Spring 2023 semesters to find and apply necessary changes to the program.

Digital and Cyber Forensic Science PHD

Communication

Goal Description:

The ability to communicate effectively with a range of audiences.

Providing Department: Digital and Cyber Forensic Science PHD

Progress: Ongoing

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Communication

Learning Objective Description:

Students will demonstrate the ability to communicate at a professional level in written and oral form

RELATED ITEM LEVEL 2

Comprehensive Examinations

Indicator Description:

At the end of the second year of study, each student is required to take and pass the written comprehensive examination (WCE) in order to advance to candidacy. A passing grade is defined as scoring 70 or above out of 100, and a high pass grade is defined as scoring 85 or above out of 100. Doctoral faculty who teach the core courses in the doctoral program are responsible for designing exam questions. Each student is given two hours on each of the 6 core subjects.

Faculty who prepare the examination questions are responsible for grading and reporting.

Criterion Description:

Doctoral faculty who prepare exam questions are responsible for grading and reporting the grades to the program advisor. Each exam score should be numeric number between 0 and 100, so that a fail (69 or below), pass (70-84), or high pass (85-100) can be determined.

Findings Description:

The doctoral committee decided to employ three comprehensive exams in OS Forensics, DF Tools, and Network forensics. 7 students took the network forensics exam and earned a "high Pass". 8 students took the OS Forensics exam with one student failing the exam and the rest were either pass or high pass. Finally, 8 students took the DF Tools exam and all passed the exam with either pass or high pass grades.

RELATED ITEM LEVEL 3

Comprehensive Examinations

Action Description:

The doctoral committee has made a couple of changes to the examination format. In lieu of multi-day exams, the committee has favored exams to be conducted in a hybrid fashion involving hands-on, oral, and written exams - all to be completed on the same day.

RELATED ITEM LEVEL 2

Dissertation

Indicator Description:

Each student, once candidacy has been attained, will develop a research agenda leading to the identification, analysis, and solution of a significant problem in Digital and Cyber Forensic Science.

The resulting documentation (dissertation) will identify:

- The significance and need for the study
- A review of current literature supporting the basis for the study and explicating the need for the study
- A methodology to address the problem
- Description and analysis of the results of the research
- Identification of the implications of the results, and future areas of research resulting from the study.

Criterion Description:

This indicator is achieved by the student giving a proposal presentation to the committee.

Findings Description:

Two students, Ashar Neyaz and Sundar Krishnan, are getting ready to defend their dissertation Summer 2022, before the July 6th deadline. They have both secured faculty positions and are on track to graduate successfully, and submit their dissertations to the graduate school, according to their committee members.

RELATED ITEM LEVEL 3

Dissertation

Action Description:

The doctoral committee is concerned about the dissertation progress of a couple of students. The feedback the students have received after the portfolio review in April should hopefully alleviate this issue and urge these students to get back on track.

RELATED ITEM LEVEL 2

Portfolio

Indicator Description:

As a student progresses through the first two years of mandatory coursework, a portfolio of achievements should be developed. This will include:

- term projects
- team projects
- research projects

- academic papers
- other materials (patents, artifacts, etc)
- teaching evaluations

the portfolio serves as a record of achievements indicating the student has been appropriately immersed in the research function, and has the ability to report the results of scholarly inquiry in a professional manner.

Criterion Description:

The students put together a portfolio using any number of online tools and/or a simple webpage that showcases their accomplishments as outlined in the indicator description for the committee to peruse.

Findings Description:

All the doctoral students put together a comprehensive portfolio in March 2022. The doctoral faculty met and discussed students' performance. The students were given feedback by their dissertation chair.

RELATED ITEM LEVEL 3

Portfolio

Action Description:

The portfolio review that was conducted in March 2022 was the first of its kind for our department. A few key issues that were pointed out by the doctoral faculty were:

1. To standardize the format for the portfolio review and the process.
2. Committee chair to deliver feedback to their students in a timely manner.

Environmental Impact

Goal Description:

The ability to recognize the local and global impact of digital forensics and cybersecurity on individuals, organizations and society.

Providing Department: Digital and Cyber Forensic Science PHD

Progress: Ongoing

Problem Solving

Goal Description:

The ability to analyze problems, identify potential solutions and design and implement systems, tools and mechanisms to address those problems.

Providing Department: Digital and Cyber Forensic Science PHD

Progress: Ongoing

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Problem Solving

Learning Objective Description:

Students will demonstrate their capability in identifying and solving relevant problems in Digital and Cyber Forensic Science.

RELATED ITEM LEVEL 2

Comprehensive Examinations

Indicator Description:

At the end of the second year of study, each student is required to take and pass the written comprehensive examination (WCE) in order to advance to candidacy. A passing grade is defined as scoring 70 or above out of 100, and a high pass grade is defined as scoring 85 or above out of 100. Doctoral faculty who teach the core courses in the doctoral program are responsible for designing exam questions. Each student is given two hours on each of the 6 core subjects.

Faculty who prepare the examination questions are responsible for grading and reporting.

Criterion Description:

Doctoral faculty who prepare exam questions are responsible for grading and reporting the grades to the program advisor. Each exam score should be numeric number between 0 and 100, so that a fail (69 or below), pass (70-84), or high pass (85-100) can be determined.

Findings Description:

The doctoral committee decided to employ three comprehensive exams in OS Forensics, DF Tools, and Network forensics. 7 students took the network forensics exam and earned a "high Pass". 8 students took the OS Forensics exam with one student failing the exam and the rest were either pass or high pass. Finally, 8 students took the DF Tools exam and all passed the exam with either pass or high pass grades.

RELATED ITEM LEVEL 3

Comprehensive Examinations

Action Description:

The doctoral committee has made a couple of changes to the examination format. In lieu of multi-day exams, the committee has favored exams to be conducted in a hybrid fashion involving hands-on, oral, and written exams - all to be completed on the same day.

RELATED ITEM LEVEL 2

Dissertation

Indicator Description:

Each student, once candidacy has been attained, will develop a research agenda leading to the identification, analysis, and solution of a significant problem in Digital and Cyber Forensic Science.

The resulting documentation (dissertation) will identify:

- The significance and need for the study
- A review of current literature supporting the basis for the study and explicating the need for the study
- A methodology to address the problem
- Description and analysis of the results of the research
- Identification of the implications of the results, and future areas of research resulting from the study.

Criterion Description:
This indicator is achieved by the student giving a proposal presentation to the committee.

Findings Description:
Two students, Ashar Neyaz and Sundar Krishnan, are getting ready to defend their dissertation Summer 2022, before the July 6th deadline. They have both secured faculty positions and are on track to graduate successfully, and submit their dissertations to the graduate school, according to their committee members.

RELATED ITEM LEVEL 3

Dissertation
Action Description:
The doctoral committee is concerned about the dissertation progress of a couple of students. The feedback the students have received after the portfolio review in April should hopefully alleviate this issue and urge these students to get back on track.

RELATED ITEM LEVEL 2

Portfolio
Indicator Description:
As a student progresses through the first two years of mandatory coursework, a portfolio of achievements should be developed. This will include:

- term projects
- team projects
- research projects
- academic papers
- other materials (patents, artifacts, etc)
- teaching evaluations

the portfolio serves as a record of achievements indicating the student has been appropriately immersed in the research function, and has the ability to report the results of scholarly inquiry in a professional manner.

Criterion Description:
The students put together a portfolio using any number of online tools and/or a simple webpage that showcases their accomplishments as outlined in the indicator description for the committee to peruse.

Findings Description:
All the doctoral students put together a comprehensive portfolio in March 2022. The doctoral faculty met and discussed students' performance. The students were given feedback by their dissertation chair.

RELATED ITEM LEVEL 3

Portfolio
Action Description:
The portfolio review that was conducted in March 2022 was the first of its kind for our department. A few key issues that were pointed out by the doctoral faculty were:

1. To standardize the format for the portfolio review and the process.
2. Committee chair to deliver feedback to their students in a timely manner.

Technical Competence

Goal Description:
Graduates with a PhD in Digital and Cyber Forensic Science will have a strong technical foundation, that is, to develop and demonstrate knowledge of theoretical materials, and computational and technical skills in the areas of digital forensics and cybersecurity sufficient to provide skilled leadership in both research and academic environments.

Providing Department: Digital and Cyber Forensic Science PHD
Progress: Ongoing

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Technical Competence
Learning Objective Description:
Students will develop and demonstrate knowledge of theoretical materials, technical skills and project management relevant to Digital and Cyber Forensic Science.

RELATED ITEM LEVEL 2

Comprehensive Examinations
Indicator Description:
At the end of the second year of study, each student is required to take and pass the written comprehensive examination (WCE) in order to advance to candidacy. A passing grade is defined as scoring 70 or above out of 100, and a high pass grade is defined as scoring 85 or above out of 100. Doctoral faculty who teach the core courses in the doctoral program are responsible for designing exam questions. Each student is given two hours on each of the 6 core subjects.

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Criterion Description:
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Findings Description:
The doctoral committee decided to employ three comprehensive exams in OS Forensics, DF Tools, and Network forensics. 7 students took the network forensics exam and earned a "high Pass". 8 students took the OS Forensics exam with one student failing the exam and the rest were either pass or high pass. Finally, 8 students took the DF Tools exam and all passed the exam with either pass or high pass grades.

RELATED ITEM LEVEL 3

Comprehensive Examinations
Action Description:
The doctoral committee has made a couple of changes to the examination format. In lieu of multi-day exams, the committee has favored exams to be conducted in a hybrid fashion involving hands-on, oral, and written exams - all to be completed on the same day.

RELATED ITEM LEVEL 2

Dissertation
Indicator Description:
Each student, once candidacy has been attained, will develop a research agenda leading to the identification, analysis, and solution of a significant problem in Digital and Cyber Forensic Science.

The resulting documentation (dissertation) will identify:

- The significance and need for the study
- A review of current literature supporting the basis for the study and explicating the need for the study
- A methodology to address the problem
- Description and analysis of the results of the research
- Identification of the implications of the results, and future areas of research resulting from the study.

Criterion Description:
This indicator is achieved by the student giving a proposal presentation to the committee.

Findings Description:
Two students, Ashar Neyaz and Sundar Krishnan, are getting ready to defend their dissertation Summer 2022, before the July 6th deadline. They have both secured faculty positions and are on track to graduate successfully, and submit their dissertations to the graduate school, according to their committee members.

RELATED ITEM LEVEL 3

Dissertation
Action Description:
The doctoral committee is concerned about the dissertation progress of a couple of students. The feedback the students have received after the portfolio review in April should hopefully alleviate this issue and urge these students to get back on track.

RELATED ITEM LEVEL 2

Portfolio
Indicator Description:
As a student progresses through the first two years of mandatory coursework, a portfolio of achievements should be developed. This will include:

- term projects
- team projects
- research projects
- academic papers
- other materials (patents, artifacts, etc)
- teaching evaluations

the portfolio serves as a record of achievements indicating the student has been appropriately immersed in the research function, and has the ability to report the results of scholarly inquiry in a professional manner.

Criterion Description:
The students put together a portfolio using any number of online tools and/or a simple webpage that showcases their accomplishments as outlined in the indicator description for the committee to peruse.

Findings Description:
All the doctoral students put together a comprehensive portfolio in March 2022. The doctoral faculty met and discussed students' performance. The students were given feedback by their dissertation chair.

RELATED ITEM LEVEL 3

Portfolio
Action Description:
The portfolio review that was conducted in March 2022 was the first of its kind for our department. A few key issues that were pointed out by the doctoral faculty were:

1. To standardize the format for the portfolio review and the process.
2. Committee chair to deliver feedback to their students in a timely manner.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

The program handbook is currently being developed. The Department doctoral committee will be meeting this academic year to discuss the indicators that ought to be used for the continuous improvement of the program in terms of PCI.

Update of Progress to the Previous Cycle's PCI:

The program handbook and the internship handbook were developed. The committee has met a few times to amend the documents and identify important indicators to be used for the continuous improvement of the program in terms of PCI.

New Plan for Continuous Improvement Item

Closing Summary:

- The doctoral committee has made a couple of changes to the examination format. In lieu of multi-day exams, the committee has favored exams to be conducted in a hybrid fashion involving hands-on, oral, and written exams - all to be completed on the same day.
- The doctoral committee is concerned about the dissertation progress of a couple of students. The feedback the students have received after the portfolio review in April should hopefully alleviate this issue and urge these students to get back on track.
- The portfolio review that was conducted in March 2022 was the first of its kind for our department. A few key issues that were pointed out by the doctoral faculty were:
    - To standardize the format for the portfolio review and the process.
    - Committee chair to deliver feedback to their students in a timely manner.

Digital Forensics MS

Technical Competence - To Develop And Demonstrate Knowledge Of Theoretical Materials, And Computational And Technical Skills

Goal Description:

Graduates with a master degree in digital forensics will have a strong technical foundation, that is, to develop and demonstrate knowledge of theoretical materials, and computational and technical skills in the areas of digital forensics.

Providing Department: Digital Forensics MS

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Understand The Body Of Knowledge Of Digital Forensics

Learning Objective Description:

Students will develop and demonstrate knowledge of theoretical materials, technical skills and project management relevant to digital forensics.

RELATED ITEM LEVEL 2

Written Comprehensive Examination

Indicator Description:

Each student is required to take and pass the written comprehensive examination (WCE) in the graduating semester. Passing grade is defined as scoring 70 or above out of 100, and high pass grade is defined as scoring 85 or above out of 100. Graduate faculty who teach the current 5 core courses of digital forensics are responsible to design exam questions. Each student is given one hour on each of the 5 subjects:

1. Digital Security
2. Digital Forensics Investigation
3. File System Forensics
4. Network and Cyber Forensics
5. Cyber Law

Faculty who gave the exam questions are responsible to grade and report grades of these exams.

Students are required to take written compressive examinations in core content areas where they did not receive an A in a core course.

Attached Files

Copy of Comp-Exams

Criterion Description:

Graduate faculty who gave the exam questions are responsible for grading and reporting the grades to graduate advisor. Each exam score should be numeric number between 0 and 100, so that a fail (69 or below), pass (70-84), or high pass (85-100) can be determined.

Findings Description:

Fall 2021: No DF students have taken the exam.

Spring 2022: Three DF student have taken the exams, and all passed.

RELATED ITEM LEVEL 3

Written Comprehensive Examination Action

Action Description:

We aim for 100% success from the Comprehensive examinations along with "A"s or "B"s. Therefore, a comprehensive exam study guide will be shared with students who will need to take the exam, also courses will be geared more toward to research direction which will help students by reflecting the expectation from capstone projects.

RELATED ITEM LEVEL 1

Apply Knowledge And Skills In Projects And Real Work Environments

Performance Objective Description:

Students will practice and demonstrate their capabilities and skills relevant to digital forensics and investigation in projects simulating real world tasks.

RELATED ITEM LEVEL 2

Final Capstone Project Assessment

KPI Description:

The final project in this degree program is a capstone project that involves the students identifying a significant application development need for a selected client and the design and implementation of an appropriate solution to that need.

Each student is assigned to a member of the graduate faculty among graduate faculty as project advisor together with two additional graduate faculty forming the student's committee.

The department has established procedures for managing projects including

1. The presentation of project proposals within the first two weeks of the semester. The graduate faculty review and approve or disapprove each proposal.

2. Weekly progress meetings with the project advisor.

3. The evaluation by the complete graduate faculty of each student's progress at midterm.

4. The distribution of project activity to the remaining members of each committee.

At the end of the project each student prepares and runs a formal presentation including a description of the project, detailed explanation of the solution used and a demonstration of the completed application.

Results Description:

Fall 2021: No DF capstone projects were presented.

Spring 2022: Three DF students have completed their projects and earned As.

RELATED ITEM LEVEL 3

Final Capstone Project Assessment Action

Action Description:

We aim for 100% success from Capstone Projects. Supervising professors and committee members for capston projects will guide students throughout their penultimate and terminal semesters, and also related courses will be geared more toward to research direction which will help students successfully complete their capston projects.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

Exit survey is conducted and results will be shared in graduate curriculum committee meeting in Fall 2022.

The GCC will conduct multiple meetings during the Fall 2022 and Spring 2023 semesters to find and apply necessary changes to the program.

Update of Progress to the Previous Cycle's PCI:

No necessary changes were found.

New Plan for Continuous Improvement Item

Closing Summary:

Exit survey is conducted and results will be shared in graduate curriculum committee meeting in Fall 2022.

The GCC will conduct multiple meetings during the Fall 2022 and Spring 2023 semesters to find and apply necessary changes to the program.

Information Assurance and Cybersecurity MS

Technical Competence - To Develop And Demonstrate Knowledge Of Theoretical Materials, And Computational And Technical Skills

Goal Description:

Graduates with a master degree in information assurance and security will have a strong technical foundation, that is, to develop and demonstrate knowledge of theoretical materials, and computational and technical skills in the areas of information assurance and information security.

Providing Department: Information Assurance and Cybersecurity MS

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Understand The Body Of Knowledge Of Information Assurance And Security

Learning Objective Description:

Students will develop and demonstrate knowledge of theoretical materials, technical skills and project management relevant to information assurance and information security.

RELATED ITEM LEVEL 2

Written Comprehensive Examination

Indicator Description:

Each student is required to take and pass the written comprehensive examination (WCE) in the graduating semester. Passing grade is defined as scoring 70 or above out of 100, and high pass grade is defined as scoring 85 or above out of 100. Graduate faculty who teach the current 5 core courses of information assurance and security are responsible to design exam questions. Each student is given one hour on each of the 5 subjects:

1. Principle and Policy in Information Assurance
2. Database Security
3. Organization System Security
4. Operating System Security
5. Business Continuity Management

Faculty who gave the exam questions are responsible to grade and report grades of these exams.

Criterion Description:

Graduate faculty who gave the exam questions are responsible for grading and reporting the grades to graduate advisor. Each exam score should be numeric number between 0 and 100, so that a fail (69 or below), pass (70-84), or high pass (85-100) can be determined.

Findings Description:

Fall 2021: Four IAC students have taken all comprehensive exams, and all of them passed.

RELATED ITEM LEVEL 3

Written Comprehensive Examination

Action Description:

We aim for 100% success from the Comprehensive examinations along with "A"s or "B"s. Therefore, a comprehensive exam study guide will be shared with students who will need to take the exam, also courses will be geared more toward to research direction which will help students by reflecting the expectation from capstone projects.

RELATED ITEM LEVEL 1

Apply Knowledge And Skills In Projects And Real Work Environments

Performance Objective Description:

Students will practice and demonstrate their capabilities and skills relevant to information assurance and security in projects simulating real world tasks.

RELATED ITEM LEVEL 2

Final Capstone Project Assessment

KPI Description:

The final project in this degree program is a capstone project that involves the students identifying a significant application development need for a selected client and the design and implementation of an appropriate solution to that need.

Each student is assigned to a member of the graduate faculty among graduate faculty as project advisor together with two additional graduate faculty forming the student's committee.

The department has established procedures for managing projects including

1. The presentation of project proposals within the first two weeks of the semester. The graduate faculty review and approve or disapprove each proposal.

2. Weekly progress meetings with the project advisor.

3. The evaluation by the complete graduate faculty of each student's progress at midterm.

4. The distribution of project activity to the remaining members of each committee.

At the end of the project each student prepares and runs a formal presentation including a description of the project, detailed explanation of the solution used and a demonstration of the completed application.

Results Description:

Fall 2021: Three IAC capstone project were completed, and all the projects were received As.

Spring 2022: Six IAC capstone projects were completed, and 4 projects were received As, 1 project were received B and 1 project received C.

RELATED ITEM LEVEL 3

Final Capstone Projection Assessment

Action Description:

We aim for 100% success from Capstone Projects. Supervising professors and committee members for capston projects will guide students throughout their penultimate and terminal semesters, and also related courses will be geared more toward to research direction which will help students successfully complete their capston projects.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

Exit survey is conducted and results will be shared in graduate curriculum committee meeting in Fall 2022.

The GCC will conduct multiple meetings during the Fall 2022 and Spring 2023 semesters to find and apply necessary changes to the program.

Update of Progress to the Previous Cycle's PCI:

No necessary changes were found.

New Plan for Continuous Improvement Item

Closing Summary:

The GCC will conduct multiple meetings during the Fall 2022 and Spring 2023 semesters to find and apply necessary changes to the program.

Department of Engineering Technology

Construction Management BS

Demonstrate Construction Management Knowledge and Skills

Goal Description:

Students will demonstrate knowledge and skills relevant to Construction Management.

Providing Department: Construction Management BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Development Of Students' Knowledge And Skill

Learning Objective Description:

Students will be able to demonstrate competency in key areas of Construction Management by successfully displaying skills in an Estimation Course. The Estimation Course serves as a capstone requirement with required skills in construction math, material pricing, bid tabulation, and project scheduling.

RELATED ITEM LEVEL 2

ETCM 4368 Cost Estimating - Knowledge and Skills

Indicator Description:

All students enrolled in the program must complete an estimation class, ETEC 4369, The course addresses key concepts and skills relevant to project cost estimation relative to the field of Construction Management. Students are expected to achieve a 2 or higher on a scale of 0-4, with 0=incompetent, 1=marginal competency, 2=proficient, 3=accomplished, 4=mastered. We expect 80% of the students evaluated will score a 2 or higher. There is consensus among the ETEC faculty that at least 80% of the students will score 2 or higher on the assessment rubric.

Criterion Description:

An evaluation was made based on the Assessment Rubric for each of the selected students exam work and their ranking is shown below.

Rubric objectives

A	B	C	D	E	F
m	m	a	a	m	m
m	m	a	m	i	i
m	m	a	a	m	m
m	g	p	i	i	i
m	m	a	m	i	i

Weighted Rubric Objectives

0.1	0.2	0.1	0.2	0.3	0.1	
5	5	1	1	5	5	3.425
5	5	1	5	0	0	2.6
5	5	1	1	5	5	3.425
5	0	0	0	0	0	0.5
5	5	1	5	0	0	2.6

Rubric Counts

		A	B	C	D	E	F
m	Mastered	5	4		2	2	2
a	Accomplished			4	2		
p	Proficient			1			
g	Marginal		1				
i	incompetent				1	3	3

Evaluation of the objective are as follows:

- Objective “A” had one student ranking as accomplished.
- Objective “B” had 4 students ranking as mastered and one as marginal.
- Objective “C” had 4 students ranking as accomplished and one as proficient.
- Objective “D” had 2 students ranking as mastered, 2 as accomplished, and one as incompetent.
- Objective “E” had 2 students ranking as mastered and 3 as incompetent.
- Objective “F” had 2 students ranking as mastered and 3 as incompetent.

The incompetent counts were due to students not turning in a portion of the work.

ETCM 4368 – Cost Estimating

Assessment Rubric

Objective	**Measures**				
	incompetent	*marginal*	*proficient*	*accomplished*	*mastered*

A	*Demonstrate the use of and proficiency in construction mathematics.* *10%*	Struggles with basic mathematics and is incapable of computing quantities.	Uses reference material to get formulas for performing construction math.	Computes quantities but slow to analyze and use appropriate methods	Identifies appropriate methods and compute quantities with little error.	Identifies appropriate methods and compute quantities in swiftly and accurately
B	*Identify components and costs of components contained in residential and commercial projects.* *20%*	Cannot identify basic building materials on plans or within documents	Has limited knowledge of building materials	Can identify basic building components on plans and within documents but slow to locate the items.	Identifies basic building materials on plans and within documents.	Identifies basic building materials on plans and within documents in a swift and accurate manner.
C	*Identify time-valued components in a construction project.* *10%*	Cannot calculate how long it take to perform a construction task	Struggles with calculating task time.	Computes time to complete construction activities for tasks and jobs.	Evaluates and computes completion times with little error.	Computes time-valued components swiftly and accurately
D	*Prepare construction material cost estimates.* *20%*	Cannot identify quantities or compute cost of materials, labor and equipment	Overlooks obvious items when preparing estimates.	Calculates construction costs and understands the concepts of pricing material, labor, and equipment	Calculates construction costs with little error.	Calculates construction costs quickly and accurately
E	*Prepare construction schedule and analysis.* *30%*	Cannot create a construction schedule with parallel tasks	Can prepare Gantt chart but does not include significant task details.	Can prepare a construction schedule using parallel tasks but struggles with modifications when in tracking mode	Prepares construction schedules with sufficient accuracy and can track work completed.	Prepares complex construction schedules and can analyze for modifications in tracking mode
F	*Demonstrate proper and effective use of sketching / drawing and writing to convey ideas and documentation.* *10%*	Lacks ability to express ideas visually or in writing.	Has trouble with describing things accurately using drawing and sketches.	Can sketch/draw to express idea and can describe adequately in writing	Conveys ideas using sketches/drawings and writing.	Expresses ideas using sketches/drawings and in writing in a concise and fluent manner
	Grade:	0 - 60	61 - 70	71 - 80	81 - 90	91 - 100

Findings Description:

ETCM 4368 – Cost Estimating was offered in the **Spring 2021** semester. The course provided students with the opportunity to apply their estimating knowledge to fictitious projects. The semester was hampered by the COVID-19 pandemic and was offered in a hybrid delivery (students attended in-person one day a week and attended remotely the other day). Five students elected to attend class remotely due to family health risk concerns and several students had to quarantine during the semester. Lack of remote access to MS Project required students to attend class to perform scheduling assignments.

The course had 27 students of which 23 students were construction management majors. From those 23 construction management students, a random sample of 5 students was obtained. An evaluation was made based on their comprehensive final examination grading consisting of an estimation project work. The final exam had a section to assess the students' knowledge in basic construction math and unit conversion. A final project assessed takeoff and pricing, bid tabulation, and project scheduling.

Exam Section				Exam	
I	II	III	IV	Score	Grade
1	.850	.750	.250	2.85	C
1	1	.583	.750	3.33	B
1	.850	.750	.250	2.85	C
1	1	.583	.750	3.33	B
1	.850	.750	.250	2.85	C

Section	
I	Basic construction math and unit conversion
II	Pricing including material and work take-off
III	Bid tabulation
IV	Project schedule

An evaluation was made based on the Assessment Rubric for each of the selected students exam work and their ranking is shown below.

Rubric objectives

A	B	C	D	E	F
m	a	a	p	m	a
m	m	m	m	m	a
m	a	a	p	m	a
m	m	m	a	m	a
m	a	a	p	m	a

Weighted Rubric Objectives

0.1	0.2	0.1	0.2	0.3	0.1	
4	3	3	2	4	3	2.975

4	4	4	4	4	3	3.675
4	3	3	2	4	3	2.975
4	4	4	3	4	3	3.475
4	3	3	2	4	3	2.975

Rubric Counts

		A	B	C	D	E	F
m	Mastered	5	2	2	1	5	
a	Accomplished		3	3	1		5
p	Proficient				3		
g	Marginal						
i	incompetent						

Evaluation of the objective are as follows:

- Objective “A” had five students ranking as mastered.
- Objective “B” had two students ranking as mastered and three as accomplished.
- Objective “C” had two students ranking as mastered and three as accomplished.
- Objective “D” had 1 student ranking as mastered, 1 as accomplished, and 3 as proficient.
- Objective “E” had five students ranking as mastered.
- Objective “F” had five students ranking as accomplished.

The incompetent counts were due to students not turning in a portion of the work.

RELATED ITEM LEVEL 3

ETCM 4368 Cost Estimation- Knowledge and Skills

Action Description:

Continue assessment and development practices in Cost Estimation of construction materials to foster the development of construction management knowledge and skills

Develop Professional Skills

Goal Description:

Students will gain necessary work force experience to compete in the construction field.

Providing Department: Construction Management BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Professional Skills

Learning Objective Description:

Students completing the BS in Engineering Technology will demonstrate skills necessary to compete in the professional marketplace through an internship.

- Students completing the BS in Engineering Technology will demonstrate skills necessary to compete in the professional marketplace through an internship.
- Students will establish a professionalism to be ready to start their successful careers in each professional field through an internship.
- Students will improve their written, oral, and graphical communication skills with stakeholders in each professional field to maintain professional working relationships.

At the conclusion of these courses, the student will have demonstrated successfully the following competencies:

1. Work in an Industrial Environment.
2. Work in either a Field Management, a Construction Management, a Superintendent Management, Project Management, Safety Management or combinations of responsibilities.
3. Develop the required reports and maintain progressive reviews that identify the progress being made on the project.
4. Supervise workers in the various trades that are under their responsibilities.
5. Write change orders on specification sheets.
6. Prepare project documents and resources to support the activities for a project.
7. Communicate with subcontractors and maintain professional working relationships.
8. Write and maintain punch list and other required documentation.
9. Exhibit characteristics associated with successful employment in industry.

RELATED ITEM LEVEL 2

ETEC 4391 Internship Evaluation

Indicator Description:

All students enrolled in the program must complete ETEC 4391 in their third or final year (Junior or Senior) of enrollment. ETEC 4391 addresses key concepts and skills, as well as practical demonstrations of competency relevant to the field of each program in the Department of Engineering Technology. Each semester interns will be evaluated by their internship supervisor and by their faculty supervisor on a faculty-developed rating scale.

Students need to meet the below student eligibility to register ETEC4391 for 3 credits or 6 credits.

1. Minimum semester hours - 32 hrs. Including 15 within the academic major/minor. Some internships may specify courses / content to have been completed.
2. Must be a student in good academic standing at SHSU.
3. Minimum grade of “C” or higher in ENG 1301 and 1302 or equivalent.

4. Transfer students become eligible upon the successful completion of one full-time semester if all other eligibility requirements are fulfilled and apply according to instructions on announcements.
5. Special information regarding Industrial Technology Trades and Industry Certification Program internships (ETEC 4391) - Due to the unique structure of this program, the above listed eligibility requirements do not apply. See the Trades and Industry Certification Program coordinator regarding specific requirements for this program.

The students in ETEC 4391 in Summer 2020 were evaluated by the following detail rubric:

COURSE EVALUATION – GRADING: 100 POINT SCALE

Weekly Reports [10 weekly reports]	20 Points
Summary of Syllabus	3 Points
Resume	3 Points
LinkedIn	2 Points
EMAIL Communication Skills	2 Points
ONLINE Video Review and Summary (1 video)	10 Points
FINAL SUMMARY PAPER	20 Points
FINAL SUMMARY PRESENTATION	20 Points
Supervisor's Evaluation	15 Points
Supervisor's working hour verification letter	5 Points
TOTAL	100 Points

Grade Scale - Final grades will be based upon the following points.

Your final numerical point will ROUND OFF to THE NEARNEST WHOLE NUMBER.

A = +90 Points

B = 80 – 89 Points

C = 70 – 79 Points

D = 60 – 69 Points

F = under 60 Points

Criterion Description:

It is expected that at least 85% of the students enrolled in ETEC 4391 will achieve above average standard (B or higher) of performance on the supervisor evaluation rating scale and the final letter grade. In general, if the students in ETEC 4391 miss to submit any assignments, the assignments not submitted will impact their final grades by two letter grades.

All assignments should be submitted to Blackboard by the specific due dates as below.

Assignments	Due Dates
10 Weekly Reports	By Midnight, Every Following Sunday i.e.: The 1st Weekly Report (May 28-30) - By Midnight, May 31, 2020
Summary of Syllabus	By Midnight on May 31, 2020
Resume	By Midnight on May 31, 2020
LinkedIn	By Midnight on Jun. 7, 2020
Online Video Review and Summary (1 Video)	By Midnight on Jul. 28, 2020
EMAIL Communication Skills	No due date. (Based on the communication between a student and the instructor)
Final Summary Paper	By Midnight on Jul. 26, 2020
Final Summary Presentation	By Midnight on Jul. 26, 2020
Supervisor's Evaluation	By Midnight on Jul. 20, 2020
Supervisor's working hour confirmation letter	By Midnight on Jul. 20, 2020

Findings Description:

There were 51 Engineering Technology students enrolled in ETEC4391-01 and/or 02 in Summer 2021. The number of students in ETEC4391-1 and/or 2 in Summer 2021 was gently increased compared to the previous year even if we are still under COVID-19. Most students successfully completed this course. The summary of our findings in relation to the learning objectives is shown in the below table.

Summarized Students' Course Achievements in ETEC 4391	
Directly supported learning objectives and student outcomes:	-Students completing the BS in Engineering Technology will demonstrate skills necessary to compete in the professional marketplace through an internship. 1. Work in an Industrial Environment. 2. Work in either a Field Management, a Construction Management, a Superintendent Management, Project Management, Safety Management or combinations of responsibilities. 3. Exhibit characteristics associated with successful employment in industry.
	-Students will establish a professionalism to be ready to start their successful careers in each professional field through an internship. 4. Develop the required reports and maintain progressive reviews that identify the progress being made on the project. 5. Supervise workers in the various trades that are under their responsibilities. 6. Write change orders on specification sheets. 7. Prepare project documents and resources to support the activities for a project.
	-Students will improve their written, oral, and graphical communication skills with stakeholders in each professional field to maintain professional working relationships. 8. Communicate with subcontractors and maintain professional working relationships 9. Write and maintain punch list and other required documentation.

Student’s internship supervisors submitted their supervisor’s evaluations with their evaluation rating scale and observations to a course instructor, and the evaluation rating was determined by immediate student’s internship supervisor using 5 rating scale from A to F and it was based on the performance of internship student at their jobsite during their internship program. 94.1% of internship students received ‘A’ from their supervisors and 3.9% of internship students received ‘B’. Only one internship student, 2.0%, received ‘C’ in Summer 2021. Therefore, 98% of internship students achieved higher rating, A or B, and the percent was higher than the target percentile of ETEC4391-1 and/or 2 in summer 2021. In addition, 98% was slightly higher than the percentile of internship students who received A or B from their supervisors in summer 2020.

Most of students completed the course in Summer 2021 and they successfully received above average final letter grade at the end of semester. The summary of the distribution of final letter grade is as follows: 90.2% of students in ETEC4391-01 and/or 02 students achieved above the average final letter grade, and the percentile is higher than the target of criterion, at least 85% of the students enrolled in ETEC 4391 will achieve above average standard (‘B’ or higher). 3.9% of students achieved ‘C’ and 5.9% of students achieved ‘D’. Overall, the percentile of internship students who received above average standard was improved in Summer 2021. The below table indicates the distribution of final letter grade of ETEC4391-01 and/or 02 in summer 2021.

Final Grade of ETEC4391-01 and/or 02 in Summer 2020	Percentile (%)
A	84.3%
B	5.9%
C	3.9%
D	5.9%

RELATED ITEM LEVEL 3

ETEC 4391 Internship Evaluation

Action Description:

Continue to utilize internships and other opportunities such as service projects to develop professional industrial skills

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

The BS in Construction Management program has just been accredited by the ABET ANSAC commission. The faculty in the program will continue to address the observations regarding the needs to add a dedicated course to the existing curriculum addressing construction law and recruitment of additional full-time faculty with the increasing students majoring in this program.

Update of Progress to the Previous Cycle's PCI:

The faculty in the Department of Engineering Technology will continue to assess the learning objectives of development and demonstration of professional skills to ensure that all Engineering Technology students will be ready to successfully start their careers in a professional industrial environment. We will continuously academically and practically support our Engineering Technology students to meet or exceed our target percentile, 85% above average rating (B or higher) of performance on the supervisor’s evaluation and final letter grade in the course of Internship

New Plan for Continuous Improvement Item

Closing Summary:

The BS in Construction Management program has just been accredited by the ABET ANSAC commission. The faculty in the program will continue to address the observations regarding the needs to add a dedicated course to the existing curriculum addressing construction law and recruitment of additional full-time faculty with the increasing students majoring in this program.

Electronics and Computer Engineering Technology BS

Develop Knowledge And Skills

Goal Description:

1. Students will develop knowledge and understanding of key concepts and skills relevant to Electronics and Computer Engineering Technology as well as Engineering technology Electronics areas.
2. Students will develop knowledge and understanding of key concepts and skills relevant to design, systems, implementation, and application engineering technology.
3. Students will develop their technical writing, presentation, and teamwork skills by working on group projects as part of the course requirement.

Providing Department: Electronics and Computer Engineering Technology BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Development Of Students' Knowledge And Skill

Learning Objective Description:

1. The students will be able to conduct standard tests and measurements; analyze and interpret experiments; apply experimental results to improve processes; and design the system (Goal 1 and 2).
2. The students will be able to function effectively as a member or leader on a technical team to develop, test and troubleshoot circuits and systems (Goal 1 and 3).
3. The students will be able to apply written, oral and graphical communication; also, will be able to identify and use appropriate technical/ non-technical literature in the ECET areas (Goal 3).

RELATED ITEM LEVEL 2

ETEE 2320 Circuits and Systems

Indicator Description:

The students enrolled in Spring 2021 were evaluated based on the following rubric:

Mid-term Exam	**20%**
Final Exam	**20%**
Laboratory Experiments	**15%**
Homework Assignments	**15%**
Attendance, Observed performance & Attitude	**10%**
Class Design Project and Presentation	**10%**
Quizzes (5-8 quizzes)	**10%**
Total	**100%**

There were 18 students in ETEE 2320 Circuits and Systems class during Spring 2021 semester. The student work included the following: one midterm exam, one final exam, eight quizzes (including take home and in-class pop quizzes), six homework's and 11 lab projects with technical reports. Students also gained their 10% of class grading based on their attendance, class participation and attitude.

The tests included fundamentals of AC circuit theory, applications of inductors (Ls), capacitors (Cs), and series and parallel combination of RLC circuit parameters, resonance, AC passive filters, frequency response, voltage, Current, Power relations, series and parallel AC circuits, ideal transformer, single phase and three-phase transformers, single phase and three phase electrical power circuits applied to industrial environments, using (j) complex parameter and complex analysis of AC circuits, real power, reactive power, and apparent power relations, power factor correction in industrial environments, efficiency concept, electrical measurements, and AC circuit troubleshooting.

Extensive labs on oscilloscope use were introduced. 11 Lab projects were required for each student and students could make up the missed labs with reported justifications. The lab projects aimed to gain extensive amount of hands-on skills and experience on the introduction of AC electrical circuits, safety, wiring, measurements, testing, and the troubleshooting open circuit and short circuit phenomena.

Extensive use of NI MultiSIM software was provided. After the first homework assignment, all other assignments included at least one design question on AC circuit analysis with NI MultiSIM digital software tool.

Criterion Description:

As suggested by the course Instructor and agreed by other ETEC faculty most students (70%) should be able to get a grade of B (70% or higher with a curve in the class as needed) or higher. The final project with a 10% course grade was required by each student and presented in the class. Similarly, the lab projects included knowledge and skills of AC circuits theory and students were provided extensive hands-on and minds-on experience on many practical AC electrical circuits and systems.

Findings Description:

There were 24 students originally enrolled in ETEE 2320 class and due to Covid related challenges 1 student dropped the class in the beginning of the semester. Therefore, there were total 23 students continued the attend the class after the first week of classes in spring 2022. . However, family matters and Covid related issues again caused three other students not to be able to attend classes even they did not drop the class. There was another student decided not to attend the class after 10^{th} week of the semester. Following is a summary of our findings in relation to the learning objectives.

Summarized Students' Course Achievements of Program Outcomes Form
Course Name: ETEE 2320 Circuits and Systems, Spring 2022 **Instructor**: Dr. Reg Pecen

Directly supported Goals and learning objectives	***PO1.*** *Possess problem solving skills involving analysis, design, and simulation, laboratory experimentation with applications to electrical and electronic components, circuits, and systems.* •Intro to AC, I and V, Phase shift, Scope Use, •Capacitors •RC Circuits Analysis using Complex Variables, TI-84 or better use/digital tools •Inductors •RL Circuits Analysis •R, L, C Elements, Circuits, Impedance Concept, P, Q, S Power relations, measurement. •Transformers – Ideal Trf, Single and 3-Phase Transformers. •Time Response of Reactive Circuits.	
	PO4. *Students will have an ability to design and carry out experiments and tests, analyze and interpret data, and make iterative improvements by using safe and technically correct laboratory methods.* • Students teamed up as 2 members in a group and there was a total of 9 groups with 9 different lab projects. • Lab experiments included: The oscilloscope and Sin Wave Measurements, Capacitors, Inductors, Charge and Discharge of Caps, Inductor operation, Series and Parallel RLC circuits, RC and RL Response, RLC Circuit Response, Series and Parallel Resonance, Passive Filter Circuit Design and Operation, Transformers, Trf operation.	
	PO8. *Students will collaborate with each other in laboratory and classroom settings to work effectively in teams.* •All students submitted technical lab reports with typed conclusion section. For each lab (12 of them), every student submitted a lab report to summarize what they have learnt and how the circuit theory and experiments complement to each other. •All students needed to submit a 4-page report on their final class project in IEEE conference. •Each group required to present in front of their peer for 8 minutes on their applied research project implementation, problems faced, how they resolved and finally a demonstration of their circuit (if any).	
Total number of students assessed (N_S): 23 during Spring 2022, 4 students failed, 3 students earned D.		
Outcome 1	Average (M_S): Mid-Term: 57.0% Quizzes: 74.39% Final Exam: 56.2%	Standard deviation (σ_S): Mid-Term: 19.17 Quizzes: 15.07Final Exam: 17.83
Outcome 2	Average (M_S): Applied Research Project: 87.30%	Standard deviation (σ_S): 23.85
Outcome 3	Average (M_S): Lab Projects: 69.5%	Standard deviation (σ_S): 20.46
Total Grading	Average (M_S): Final Grade: 63.07%	Standard deviation (σ_S): 13.93

- The overall class average was 63.07, 50% of all enrolled students got B or better and thus they have not met the expectation of min 70% as whole class grade.
- All students showed reasonable learning and hands-on skills for 12 lab projects with 69.5% . This number is very close to target number of 70%. One of the reasons for lower rate is attendance issue of few students. Except three students who continuously showed attendance problems, 86.91% of regularly attending students showed satisfactory attendance progress in the class. The class design included a success rate of 86.91. 4 out of 23 students earned a grade of A, 6 students earned a grade of B, 6 students earned a grade of C, 3 students earned a grade of D, and 4 students failed the class due to attendance and lack of work problems.
-

A breakdown for the course assessment numbers are shown below:

Above average/ Excellent (90%+)	17.4%
Met Expectation (80%+)	50.0%
Needs Work (70%+)	33.33%
Fall below expectation (60%+)	5.56%
Total	23 students (100%)

This semester classes are held all face to face with hands-on lab experiences. Unfortunately, students continue to experience attendance problems due to multiple reasons. Most common reason was Covid for students, either a family member or just being exposed to Covid patient. .One of the other challenges is familiarity with Complex Calculator such as TI-84 or better. It took few weeks to be able to teach TI-84 use for complex variables and complex calculations. Few students did not have TI-84 or better calculator. Students appreciated efforts on face-to-face education and office hours. The laboratory projects were all completed as face to face in Pirkle 140 and 142 electronics labs in both Fall and Spring 2022.

Students will be required to rent or buy e-copy of textbook as we have just confirmed with university bookstore for low-cost rental or purchase of e-book version of the textbook. Many students did not have expensive textbook and this was another obstacle for student success. We expect a better success with requirement of e-book version of textbook.

RELATED ITEM LEVEL 3

ETEE 2320 Circuits and Systems

Action Description:

- Include steps taken to improve assessment process
- Act on necessary improvement in labs, equipment needs, and course offerings per student assessment reports, IAB recommendations, and exit surveys.

RELATED ITEM LEVEL 2

ETEE 3345 Digital Electronics

Indicator Description:

The students enrolled in Spring 2020 were evaluated based on the following rubric:

Mid-term Test	**20%**
Final Exam	**20%**
Laboratory Experiments	**30%**
Homework Assignments (Best Two out of Three)	**5%**
Attendance	**5%**
Respecting Deadline, Maintaining your Group, Respecting Security Measures, Attitude	**5%**
Final Project	**15%**
Total	**100%**

Each student submitted three HW's based on the lectures given on Number systems, Gates, Boolean Algebra, De-Morgan's, Logic Minimization etc. The students had to sit for two exams – mid-term (20%) and Final (20%). Mid-term exam on number Systems, basic of digital electronics, logic minimization, De-Morgan's and gates; final exam on Latches, Counters, Shift Registers, different applications like MUX/DEMUX, Encoder/Decoder, Half/Full Adder etc. Each student was assigned in a group of two and worked on final project (15%). The students had to attend 7 LABS (30%), in rotation of two groups to maintain the social distancing. Each lab was done in two days with two groups. We also lost one week due to unprecedented cold in the area. Students did troubleshoot problems associated with different aspects of this course. For example, one lab was on 4-bit adder, another was on shift register. Bonus points were allocated for labs on counter, which we would have done in normal times (11 labs vs 7). This year due to more in-person opportunities, students were encouraged to built prototype for their final project and upload a video demonstration for the peers. They also had to make powerpoint slides and present in front of their peer. They needed to submit a technical report in IEEE conference format on their project. 5% grade was assigned for respecting deadline, maintaining security measures and showing up on assigned LAB day. Every student had to wear masks or face coverings, come in the LAB, use the sanitizing wipes installed in the LAB room, wipe down seats, table, all equipment's even before they start doing the lab. Once they are done, they needed to repeat this, so the station is sanitized and ready for the next person. Also, the rotation was necessary, and students if did not show up on their assigned lab day, it would have created space issue in the lab and compromise the social distancing.

Criterion Description:

This course is a study of the principles and applications of digital logic circuits including number systems; logic gates; counters; shift registers; sequential and combinational logic circuits; and laboratory experiences consist of experimental problems. The Engineering Technology programs generally assess the criterion description of at least 80% of the students will perform at an acceptable level of a score of four or higher. As suggested by the course Instructor Dr. Basith, most students (80%) should be able to get a grade of B (80%) or higher.

Findings Description:

There were 20 total students enrolled for Spring 2022, one student dropped midway, and 19 completed the course. following is a summary of our findings in relation to the learning objectives.

<table>
<tr><td colspan="3">Summarized Students' Course Achievements of Program Outcomes Form</td></tr>
<tr><td colspan="3">Course Name: ETEE 3345 Digital Electronics, Spring 2022
Instructor: Dr. Iftekhar Ibne Basith</td></tr>
<tr><td rowspan="3">Directly supported Goals and learning objectives:</td><td colspan="2">1. The students will be able to conduct standard tests and measurements; analyze and interpret experiments; apply experimental results to improve processes; and design the system:
•Different number systems and conversion between them.
•Logic Gates, Boolean algebra, sequential logic, minimization.
•Timing Diagram, multi-level gating.
•MUX/DEMUX, Half/Full Adder, Comparator, Encoder/Decoder.
•Shift registers: Serial In – Serial Out, Serial In – Parallel Out, Parallel In – Serial Out, Parallel In – Parallel Out.
•Counters, Ring counter, Johnson Counter, Asynchronous and Synchronous counters.
•Learning the theory in lectures and then build, troubleshoot, and test above concepts through FESTO LX new interface and FACET boards.</td></tr>
<tr><td colspan="2">2. The students will be able to function effectively as a member or leader on a technical team:
•Students teamed up as 2 members in a group and there were 9 such groups. One student presented alone making the total group count to 10.
•Some examples are: Sun tracking Solar Panel, Self monitoring Aquaponic System, Digital Function Generatoretc.</td></tr>
<tr><td colspan="2">3. The students will be able to apply written, oral and graphical communication; also, will be able to identify and use appropriate technical/ non-technical literature:
•All students needed to submit a 4-page report on their project in IEEE conference format.
•Each group required to present in front of their peer for 6-7 minutes on their project implementation, problems faced, and how they resolved.
•For each lab (13 of them), every student uploaded a LAB report to summarize what they have learnt on corresponding day and how theory and experiments complement each other.</td></tr>
<tr><td colspan="3">Total number of students assessed (N_s): 19 during Spring 2022</td></tr>
<tr><td>Outcome 1</td><td>Average (M_s):
Mid-Term: 60.1%
Final Exam: 55.26%</td><td>Standard deviation (σ_S):
Mid-Term: 3.71
Final Exam: 2.53</td></tr>
<tr><td>Outcome 2</td><td>Average (M_s):
Final Project: 92.83%</td><td>Standard deviation (σ_S):
1.00</td></tr>
<tr><td>Outcome 3</td><td>Average (M_s):
LABS: 79.67%</td><td>Standard deviation (σ_S):
1.98</td></tr>
<tr><td>Total Grading (after curve)</td><td>Average (M_s):
Final Grade: 85.58%</td><td>Standard deviation (σ_S):
7.62</td></tr>
</table>

The whole course grade breakdown (out of 100)	
Above average/ Excellent (90%+)	42.1% (8)
Met Expectation (80%+)	42.1% (8)
Needs Work/ Developing (70%+)	15.8% (3)
Below Par (60%+)	0% (0)
Total	100% (19)

As a whole class, 84.2% of enrolled students got 80 or higher which meet the primary expectation. 3 out of total 19 students got less than 80%, which is 15.8% and rooms for improvement is there. We also feel there is scope for improvement on the theory side, where students failed to perform as expected (57.68% average).

RELATED ITEM LEVEL 3

ETEE 3345 Digital Electronics

Action Description:

- Include steps taken to improve assessment process
- Act on necessary improvement in labs, equipment needs, and course offerings per student assessment reports, IAB recommendations, and exit surveys.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

There was minor title change request on one of the courses ETEE 4351 Automation & Control Systems (that was supposed to be Automation and PLCs) was not reflected to the new catalog and this will be fixed in the next curriculum cycle. There was also minor course prefix change from ETEC 3376 Microcontroller Applications to ETEE 3376 and this was also not reflected to the new catalog, thus this update will be completed in next curriculum cycle. There is also a new course proposal titled ETEE 4375 Digital VLSI Design & FPGA that was approved by the University Curriculum Committee (UCC) in April 2021, and it is expected to be added to the catalog next year. This new class will offer students depth in knowledge and provide skills in the advanced digital design fields.

We are offering another course on Wireless and Data Communication in Fall 2021 as special topics. Our goal was to have this course designated with a specific course number and it is already included in the 2021-2022 curriculum as elective for the students.

Update of Progress to the Previous Cycle's PCI:

- We are providing details of actions taken to improve assessment process and meet the learning outcomes in respect to the goals specified.
- We will be more diligent in continuous assessment of the learning objective and goals in respect of other courses in ECET degree programs as well.
- The introduction and availability of cutting-edge equipment’s are here to ensure that our students are well-prepared for the fast-changing industry and dynamic marketplace.
- We will continue our efforts to meet and exceed the criterion description of 70% students scoring 70% or higher for ETEE 3345 while meeting and exceeding the criterion description of 70% students scoring 70% or higher for a sophomore level class, ETEE 2320. It is expected that future students will achieve at a similar level in both courses.
- The title change request on ETEE 4351 from Automation & Control Systems to be Automation and PLCs has been approved and reflected in new catalog.
- The minor course prefix change from ETEC 3376 Microcontroller Applications to ETEE 3376 is also approved and reflected in the new catalog, thus this update will be completed in next curriculum cycle.
- The new course titled ETEE 4375 Digital VLSI Design & FPGA is in catalog now as an elective and was offered in Fall 2021.
- The special topics course on Wireless and Data Communication that includes IoT, Network Masking and Security did not make in Fall 2021. Our goal is to have this course designated with a specific course number and include it in the 2023-2024 curriculum as elective for the students.
- As the ECET major program and the electronics concentration steadily grew (2020-2021), one of the major accomplishments during 2021-2022 was to add a new FTE to the department in the electronics area. Dr. Abdulhamid Zaidi joined us in Fall 2021 as Visiting Assistant Professor to meet our course load.
- As the need on service class of ETEE 1340 Introduction to Circuits increases due to growing new major of B.S. in Mechanical Engineering Technology, Mr. Eugene Ryman, a retired Electrical Engineer with graduate degree was hired as a pool faculty member. Mr. Ryman is now teaching multiple sections of ETEE 1340.

- ETEE 2320 Circuits and Systems and ETEE 3345 Digital Electronics classes were offered in Spring 2022, and a complete set of assessment criterion has been developed and added in this report for evaluation. The data from students have been summarized to meet the goals and learning objectives specified.
- Three new members joined our Industrial Advisory Board (IAB) team, all very qualified and represent diverse career field for Engineering Technology students. We had two IAB meetings held on October 22nd, 2021 (Fall) and April 1st, 2022 (Spring).
- As required by ABET-ETAC, we are collecting the exit surveys for the graduating seniors and the alumni surveys to improve our program to meet the industry need.
- The ECET curriculum now looks more solid and strong for an application for ABET accreditation. We are preparing the readiness report and expecting to submit by Fall 2022 or Spring 2023 the latest.

S. in ECET program requirements according to 2022-23 university catalog will be listed as shown below:

Bachelor of Science, Major in Electronics and Computer Engineering Technology		
Core Curriculum		
Component Area I (Communication)		6
Component Area II (Mathematics)		3
Component Area III (Life and Physical Science)		8
Component Area IV (Language, Philosophy, and Culture)		3
Component Area V (Creative Arts)		3
Component Area VI (U.S. History)		6
Component Area VII (Political Science/Government)		6
Component Area VIII (Social and Behavioral Sciences)		3
Component Area IX (Component Area Option)		4
Degree Specific Requirements		
PHYS 1301 & PHYS 1101	General Phy-Mechanics & Heat and General Physics Laboratory I	4

PHYS 1302 & PHYS 1102	Gen Phy-Snd,Lght, Elec, & Mag and General Physics Laboratory II	4
MATH 1410 or MATH 1314, and MATH 1316	Elementary Functions Pre-Calculus Algebra and Plane Trigonometry [1]	4
MATH 1420	Calculus I [2]	4
ENGL 3330	Intro to Technical Writing	3
MATH 3379	Statistical Mthods in Practice	3
Major Core		
ETEE 1340	Introduction to Circuits	3
ETDD 1361	Engineering Graphics	3
COSC 1436	Programming Fundamentals I	4
COSC 1437	Programming Fundamentals II	4
Major		
ETEC 1010	Engineering Foundations	1
ETEE 2320	Circuits and Systems	3
COSC 2327	Intro to Computer Networks	3
COSC 2329	Comp Organiz & Machine Lang	3
ETEE 3313	Industrial Robotics	3
COSC 3327	Computer Architecture	3
ETEC 3340 or ETEC 4340	Solar and Wind Energy Systems Alternative Energy Technology	3
ETEE 3345	Digital Electronics	3
ETEE 3350	Analog Electronics	3
ETEE 3360	Electrical Power & Machinery	3
ETEE 3373	Control Systems Technology	3
ETEE 3376	Microcontroller Applications	3
ETEE 4351	Automation & PLC	3
ETEE 4352	Instrumentation & Interfacing	3
ETEE 4355	Electronics and Digital Comm	3
Internship		3
ETEC 4391	Work Base Mentorship	3
ETEC 4399	Senior Design	3
Double Dips (3 SH MATH 1410 and 1 SH MATH 1420)		**-4**
Total Hours		**124**

New Plan for Continuous Improvement Item

Closing Summary:

- Due to CoVID impact and lack of school district visits, the enrollment numbers in the ECET program and ETEE concentration in the last two years indicate a decrease. One of the main goals for 2022-2023 academic year is to increase the recruiting efforts, visit local and regional school districts. Our goal is to increase the enrollment by at least 15%.
- Getting ready for ABET accreditation and submitting the initial readiness report by Fall 2022 or Spring 2023.
- Continue to recruit more Industry Advisory Board members from diverse career areas.
- Looking for donors from industry and advisory board to strengthen the existing laboratories.

Engineering Design Technology BS

Develop Knowledge And Skills

Goal Description:

Students will develop theoretical knowledge, practical skills with 3D modeling tools, and hands-on practical skills relevant to the Engineering Design Technology, including becoming proficient in using design software packages, developing critical think skills, generating additive or subtractive manufacturing prototypes, and writing technical documents.

Providing Department: Engineering Design Technology BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Development Of Students Knowledge And Skill

Learning Objective Description:

Students will demonstrate competency in applying product design and development tools such as Creo Parametric, AutoCAD, Solidworks (CAD) software and 3D printer to design and prototype products.

Attached Files

EDT Assessment-Plan-Summary_Learning Objective Description.pdf

RELATED ITEM LEVEL 2

ETDD 4339 Computer-Aided Drafting Productivity

Indicator Description:

All students enrolled in the program are required to complete ETDD 4339 and successfully demonstrate effective use of resources and acceptable designing skills. Each semester, seven randomly selected assignments from five randomly selected students enrolled in the course will be reviewed by faculty members with expertise in the field. Faculty members will score the assignments using a scale of 1 - 5 with 3 "meets expectations," 4 "exceeds expectations," and 5 "far exceeds expectations."

Criterion Description:

There is a general consensus among faculty members that at least 70% of the students enrolled in ETDD 4339 will perform at an acceptable level with a score of 3.5 (meets standards) or higher.

Assignments:

There are two types of assignments: In-class Labwork Assignments (Classwork CW) and Homework Assignments (HW). CW assignments are given based on the techniques discussed in the class. Unless otherwise specified by the instructor, in-class lab assignments must be completed in the class meeting hours.

Final Grading: Final grades will be determined by assigning the following weighting to each area:

Attendance and Observed Performance: 10%
Homework Assignments: 20%
In-class (Classwork) Assignments: 10%
Group Project: 10%
Mid Term Exam (15%)/Quiz (10%): 25%
Final Exam: 25%

Grading Scale

A (90-100)
B (80-89)
C (70-79)
D (60-69)
E (<60)

Part Grading	Total

Sketch				
	Weak Dimensions	25%		100%
	Broken & Overlapping lines	25%		
3D Model				
	3D Tools	50%		

Drawing Grading				Total
Views				
	Orthogonal	12.50%	50%	100%
	Projected	12.50%		
	Sections, Aux, Detail	25%		
Dimensions				
	Dimensions	25%	50%	
	Datums, Axis	25%		

Assembly Grading				Total
Assembly				
	Constraints	12.50%	50%	100%
	Orientation	12.50%		
	Sections	25%		
Assembly Drawing				
	Views	25%	50%	
	BOM	25%		

Findings Description:

ETDD 4339 – Advanced CAD was offered in Spring and Fall of 2021 and Spring 2022. Out of 17 students in the spring 2021 semester 16 received D or better scores, completing all the required assignments in the class. One student received failing score due to missing the second half of the semester despite her excellent progress in class. The lowest term score was 34.88 and the highest was 100 as shown on table ETDD 1

Table ETDD 1. Spring 2021 Term score breakdown

ATT	Q	MT	GP	Final	Term Scor	Adjusted	
10	9.731818	14.2	10	22.5	90.73299	96.75699	A
10	6.990909	9.95	8	18.25	75.88667	81.91067	B
9	7.840909	11.45	10	21.75	81.66488	87.68888	B
10	8.75	13.55	10	21.25	88.86857	94.89257	A
9	9.868182	13.4	5	23	87.30838	93.33238	A
3	3.75	0	0	11.25	27.47749	60	D
10	5.195455	5.7	5	25	71.56602	77.59002	C
10	10	14	7.5	11.25	79.85121	100	A
10	9.181818	11.7	8	25	89.64506	95.66906	A
9	9.681818	14.6	7.5	25	93.97628	100.0003	A
8	8.286364	12.15	7.5	25	82.98754	89.01154	B
9	9.25	12	10	25	91.41416	97.43816	A
10	8.072727	13.6	7.5	25	90.59114	100	A
7	5.5	12.2	5	18.25	61.97597	67.99997	D
10	7.681818	11.5	10	19.75	85.65696	91.68096	A
10	9.745455	12.2	10	20	87.3	93.324	A
5	5	0	8	0	28.8658	34.8898	F

For the Fall 2021 semester out of 20 registered students, three received failing scores (one never attended the course, and other two were overwhelmed with other classes per their explanation). Table ETDD 2 is a breakdown of term scores for Fall 2021

Table ETDD 2. Fall 2021 score breakdown

10%	10%	20%	10%	15%	10%	25%	100%	
ATT	CW AVG	HW AVG	Group Project	Mid Term	Quiz Test	Final Exam	Total Grade	Grade
10	9.9	15.0691	10	15	10	0	80.57	B
2.22222	2.22222	1.81818	0	0	3.7	0	9.96	F
0	1.11111	0	0	0	0	0	1.11	F
1.11111	1.11111	1.80364	10	0	0	0	100.00	A
1.11111	0.31111	0	0	0	0	0	1.42	F
10	10.1593	16.1455	10	9.9	10	24.5	95.70	A
10	9.86296	15.8945	10	15	9.5	23.75	94.01	A
7.77778	9.54815	13.4	10	15	0	0	110.73	A
8.88889	8.28889	18.3418	10	15	5	0	100.52	A
10	10.0519	10.2618	10	14.4	8.5	0	106.21	A
2.22222	2.77778	4.36364	0	15	4	0	28.36	F
10	9.54815	18.0727	10	9.9	4.5	0	100.02	A
7.77778	5.92963	4.54545	0	7.5	5	24.5	60.25	D
10	9.77407	15.3527	0	15	3.5	24.5	78.13	C
10	10.1259	20.1091	10	10.5	9.7	25	100.44	A
10	10.1667	9.43636	10	0	0	0	90.60	A
3.33333	2.37407	1.38182	0	0	0	0	7.09	F
8.88889	8.97778	15.8727	10	0	9.5	0	103.24	A
2.22222	2.15926	3.63636	0	0	0	0	8.02	F
10	10.2148	19.4545	10	12	9.7	0	104.37	A

In the spring 2022 semester, there were 19 registered students, two of whom were repeating from Fall 2021 and passed the course with the highest score. 17 out of 19 students received C or better scores, while the two received the failing scores (one of them repeated from last semester and never attended the course and the other one was overwhelmed with other classes). Table ETDD 3 shows the breakdown of term scores:

Table ETDD 3. Detailed term grade scores for ETDD 4339 Spring 2022 semester

CW	HW	ATT	Q	MT	GP	Final		Term Grade [	
1.70833	2.22222	10	5	0	0	0		18.9306	F
2.48808	4.78556	10	3.5	9.6	0	25		100	A
0.825	1.88889	10	0	0	0	0		12.7139	F
8.86375	18.6733	10	9.4	11.85	9.491	25		100	A
8.92383	18.8133	10	9.9	14.25	9.491	25		100	A
6.02433	7.66689	10	6	7.7	10	23.7083		71.0996	C
9.00842	19.6373	10	9.95	15	10	25		100	A
5.68792	9.74467	10	5.2	7.95	0	25		100	A
1.89675	0.48133	10	0	1.5	0	0		13.8781	F
9.37717	18.1098	10	8.6	12.75	9.491	24.0208		92.3488	A
9.5335	18.7409	10	9	14.7	9.491	9.29167		80.7571	B
5.9255	13.0578	10	9.9	12.24	0	25		100	A
7.221	9.914	10	5	11.595	0	25		100	A
8.47958	13.4444	10	9.9	12.9	0	25		100	A
7.1305	11.9078	10	10	14.799	10	25		100	A
8.00967	10.1373	10	10	14.7	0	25		100	A
4.85825	5.76289	10	4.6	14.4	10	25		100	A
3.58325	6.948	10	4.7	11.8995	10	25		100	A
7.43692	16.6989	10	10	10.9995	0	25		100	A
5.10708	8.16533	10	5	4.9995	0	25		100	A

RELATED ITEM LEVEL 3

ETDD 4339 Computer-Aided Drafting Productivity

Action Description:

The findings revealed that the students are doing great in this class submitting their required assignments and completing the term group projects as well as their presentations. The instructor see that some of the students do not come to class or get overwhelmed with other courses. The instructor will continue to send reminder emails for the assignments and will also continue uploading recorded lecture notes on the Blackboard.

Develop Professional Skills

Goal Description:

Students completing the BS in Engineering Design will demonstrate skills necessary to compete in the professional marketplace through an internship as well as develop practical hands-on prototypes throughout the courses.

Providing Department: Engineering Design Technology BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Professional Skills

Learning Objective Description:

This is a computer applications course for design and drafting and introduces students to the techniques used to produce technical models/drawings. Students will learn drafting practices and how to apply them using computer-aided software. Prior knowledge of drafting software and/or prior experience of working with computers is advantageous, but not required/expected. Students will produce technical drawings using various computer design and drafting practices. Concepts of 2D drawings will be covered along with an introduction to three-dimensional parametric modeling. The intent is to develop fundamental knowledge and skills that are conceptually applicable to any computer-aided design (CAD) system.

RELATED ITEM LEVEL 2

ETEC 4391 Internship Evaluation

Indicator Description:

All students enrolled in the program must complete ETEC 4391 in their third or final year of enrollment. ETEC 4391 addresses key concepts and skills, as well as practical demonstrations of competency relevant to the field of each program in the Department of Engineering Technology. Each semester interns will be evaluated by their internship supervisor and by their faculty supervisor on a faculty-developed rating scale.

All students enrolled in the program must complete ETEC 4391 in their junior or senior year of enrollment, and the students need to meet the below student eligibility to register ETEC4391.

1. Minimum semester hours - 32 hrs. Including 15 within the academic major/minor. Some internships may specify courses / content to have been completed.
2. Must be a student in good academic standing at SHSU.
3. Minimum grade of “C” or higher in ENG 1301 and 1302 or equivalent.
4. Transfer students become eligible upon the successful completion of one full-time semester if all other eligibility requirements are fulfilled and apply according to instructions on announcements.
5. Special information regarding Industrial Technology Trades and Industry Certification Program internships (ETEC 4391) - Due to the unique structure of this program, the above listed eligibility requirements do not apply. See the Trades and Industry Certification Program coordinator regarding specific requirements for this program.

The students in ETEC 4391 in Summer 2019 were evaluated by the following detail rubric:

COURSE EVALUATION – GRADING: 100 POINT SCALE

Weekly Reports [10 weekly reports]	10 Points

Summary of Syllabus	5 Points
Resume	5 Points
LinkedIn	5 Points
EMAIL Communication Skills	5 Points
ONLINE Video Review and Summary	10 Points
FINAL SUMMARY PAPER	20 Points
FINAL SUMMARY PRESENTATION	20 Points
Supervisor's Evaluation	15 Points
Supervisor's working hour confirmation letter	5 Points
TOTAL	100 Points

FINAL LETTER GRADE

A = +90 Points

B = 80 – 89 Points

C = 70 – 79 Points

D = 60 – 69 Points

F = under 60%

Criterion Description:

It is expected that at least 85% of the students enrolled in ETEC 4391 will achieve above average standard (4 or higher) of performance on the supervisor rating scale. In general, if the students in ETEC 4391 miss to submit any assignments, the assignments not submitted will impact their final grades by two letter grades.

All assignments should be submitted the specific due dates as below.

Assignments	Due Dates
10 Weekly Reports	By Midnight, Every Following Monday i.e.: The 1st Weekly Report → By Midnight, Jun. 3.
Summary of Syllabus	By Midnight on Jun. 3, 2019
Resume	By Midnight on Jun. 3, 2019
LinkedIn	By Midnight on Jun. 10, 2019
Online Video Review and Summary (1 Video)	By Midnight on Jul. 1, 2019
EMAIL Communication Skills	No due date. (Based on the communication between a student and the instructor)
Final Summary Paper	By Midnight on Jul. 29, 2019
Final Summary Presentation	By Midnight on Jul. 29, 2019
Supervisor's Evaluation	By Midnight on Jul. 29, 2019
Supervisor's working hour confirmation letter	By Midnight on Jul. 29, 2019

Findings Description:

There were 51 Engineering Technology students enrolled in ETEC4391-01 and/or 02 in Summer 2021. The number of students in ETEC4391-1 and/or 2 in Summer 2021 was gently increased compared to the previous year even if we are still under COVID-19. Most students successfully completed this course. The summary of our findings in relation to the learning objectives is shown in the below table.

Summarized Students' Course Achievements in ETEC 4391	
Directly supported learning objectives and student outcomes:	-Students completing the BS in Engineering Technology will demonstrate skills necessary to compete in the professional marketplace through an internship. 1. Work in an Industrial Environment. 2. Work in either a Field Management, a Construction Management, a Superintendent Management, Project Management, Safety Management or combinations of responsibilities. 3. Exhibit characteristics associated with successful employment in industry.
	-Students will establish a professionalism to be ready to start their successful careers in each professional field through an internship. 4. Develop the required reports and maintain progressive reviews that identify the progress being made on the project. 5. Supervise workers in the various trades that are under their responsibilities. 6. Write change orders on specification sheets. 7. Prepare project documents and resources to support the activities for a project.
	-Students will improve their written, oral, and graphical communication skills with stakeholders in each professional field to maintain professional working relationships. 8. Communicate with subcontractors and maintain professional working relationships 9. Write and maintain punch list and other required documentation.

Student's internship supervisors submitted their supervisor's evaluations with their evaluation rating scale and observations to a course instructor, and the evaluation rating was determined by immediate student's internship supervisor using 5 rating scale from A to F and it was based on the performance of internship student at their jobsite during their internship program. 94.1% of internship students received 'A' from their supervisors and 3.9% of internship students received 'B'. Only one internship student, 2.0%, received 'C' in Summer 2021. Therefore, 98% of

internship students achieved higher rating, A or B, and the percent was higher than the target percentile of ETEC4391-1 and/or 2 in summer 2021. In addition, 98% was slightly higher than the percentile of internship students who received A or B from their supervisors in summer 2020.

Most of students completed the course in Summer 2021 and they successfully received above average final letter grade at the end of semester. The summary of the distribution of final letter grade is as follows: 90.2% of students in ETEC4391-01 and/or 02 students achieved above the average final letter grade, and the percentile is higher than the target of criterion, at least 85% of the students enrolled in ETEC 4391 will achieve above average standard ('B' or higher). 3.9% of students achieved 'C' and 5.9% of students achieved 'D'. Overall, the percentile of internship students who received above average standard was improved in Summer 2021. The below table indicates the distribution of final letter grade of ETEC4391-01 and/or 02 in summer 2021.

Final Grade of ETEC4391-01 and/or 02 in Summer 2020	Percentile (%)
A	84.3%
B	5.9%
C	3.9%
D	5.9%

RELATED ITEM LEVEL 3

ETEC 4391 Internship Evaluation

Action Description:

Continue to utilize internships and other opportunities such as service projects to develop professional industrial skills

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

- With the new lecturer hired for the program, the program faculty has discussed to offer ETDD 1366 Machining Technology I in the spring 2022 as a pilot. This course will support the program and Industrial Advisory Board's recommendation to introduce manual CNC and lathe control education to the students. We discussed to continue to offer the course in the Fall of 2022 and develop a more advanced machining technology course for the spring semester to continue the progression in the manufacturing education.
- Additionally, the program faculty has discussed to offer ETDD 2366 Machining Technology II in the Spring of 2023 semester. This course will teach G-Code programming as well as automated CNC manufacturing within the course.
- The engineering design technology faculty will be meeting bimonthly to review course schedules, assessment, and recruitment strategies for the program. This discussion will explore various assessment methods to improve the currently employed procedures. We will start with the development of an assessment tool for the Machining Technology I.
- Additionally, the program faculty will revise current ETDD 1361 course for consistency. There are 5 sections of the course, which is required by other disciplines, including construction, design, and mechanical engineering technology, as well as some agriculture departmental courses. We will be proposing to conduct a brief survey at the beginning of each semester to identify most of the students represented by a program to adjust the course content to meet those students' needs. For instance, if the 80% of the students are from construction, then the instructor would focus more on the architectural cad rather than the part manufacturing. We will also explore the possibility of dedicating some of the sections specifically for construction, design and mechanical. However, students' schedules will also be considered so they can take this course at the most convenient times.

Update of Progress to the Previous Cycle's PCI:

The faculty in the Department of Engineering Technology will continue to assess the learning objectives of development and demonstration of professional skills to ensure that all Engineering Technology students will be ready to successfully start their careers in a professional industrial environment. We will continuously academically and practically support our Engineering Technology students to meet or exceed our target percentile, 85% above average rating (B or higher) of performance on the supervisor's evaluation and final letter grade in the course of Internship.

The new lecturer has been certifying students to OSHA standards and the faculty will incorporate new NCCER certification techniques in classes. The program faculty has updated the ETDD 1361 course syllabus, and the instructors have been following the same course materials.

The machining technology I course was proposed, however, the newly hired lecturer was assigned to a different course and a newly hired tenure track assistant professor taught the machining technology course successfully.

The faculty has successfully proposed to offer machining technology II in the fall 2022 semester and the newly hired assistant professor will be teaching the course in the fall of 2022.

The program faculty has been meeting bi weekly to discuss the current progress of actions and taking necessary revisions. The faculty will continue to meet in the future as we see the benefit.

New Plan for Continuous Improvement Item

Closing Summary:

The faculty in the program will continue to address the observations regarding the needs to add a dedicated course to the existing curriculum addressing construction law and recruitment of additional full-time faculty with the increasing students majoring in this program. A newly hired lecturer for ETEC that will teach ETDD 1361 will meet with the program faculty and will be invited to biweekly meetings to observe and monitor ETDD 1361 consistency.

Mechanical Engineering Technology BS

Demonstrate Effective Professional Communication Skills

Goal Description:

Students will develop effective professional communication skills through course activities such as written reports, team projects, oral presentations, and graphical documents.

Providing Department: Mechanical Engineering Technology BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Effective Professional Communication Skills

Learning Objective Description:

Students will develop theoretical knowledge and practical skills relevant to mechanical engineering technology, including stress and strain, deformation, and experimental tests for structural elements such as beams. Students will be able to:

- Analysis structural members subjected to tension, compression, torsion, bending and combined stresses using the fundamental concepts of stress, strain, and elastic behavior of materials
- Analysis of stresses, strains, deflection, and deformation in bodies under the action of loads
- Understanding bending and shearing stresses in beams, stress and shear flow formulas, combined stresses and Mohr's circle, torsion on a circular shaft
- Perform lab experiments that relate to stresses and strain in different structures

RELATED ITEM LEVEL 2

Demonstrate Effective Professional Communication Skills

Indicator Description:

- ETEC 4376 is required for students enrolled in the Mechanical Engineering Technology program. This course addresses the strength of materials subjected to various mechanical loads with applications to the analysis of structural elements such as beams
- Students are expected to achieve a 70 or higher on a scale of 100 and standard in which 90% ≤ A, 80% ≤ B < 90%, 70% ≤ C < 80%, 60% ≤ D < 70%, F < 60%
- The overall grade for the ETEC 4376 Strength of Materials course is broken down as follows: Exam 1 and Exam 2 are 15% each, Final Exam is 20%, Homework assignments are 20%, and Laboratory is 30%

Criterion Description:

Homework assignments

The more in-depth assignments are given to students to practice more in different topics and to learn working on their own.

Midterm Exam

Students are assigned exam problems related to the first part of the course material.

Final exam

Students are assigned exam problems that conclude all the course material taught in class.

Lab experiments

Students perform different experiments to understand the concepts taught in class and they submit a lab report after each experiment.

Findings Description:

ETEC 4376 Strength of Materials is a senior-level course, and it was offered in Fall 2021. Since the Mechanical Engineering Technology BS is a new program (started in Fall 2020), only two transferred students enrolled in this course. Therefore, the results obtained in this academic year are not significant. We will continue collecting data and expect more students will enroll in this course as they progress into junior/senior levels.

RELATED ITEM LEVEL 3

Action - Communication Skills

Action Description:

The faculty will continue to collect data to assess students' performance in the ETEC 4376 Strength of Materials course, and thus evaluate their communication skills

Demonstrate Knowledge and Skills

Goal Description:

Students will develop theoretical knowledge and practical skills relevant to mechanical engineering technology, such as mechanical design, analysis, prototyping, and testing

Providing Department: Mechanical Engineering Technology BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Knowledge and Skills

Learning Objective Description:

Students will develop theoretical knowledge and practical skills relevant to mechanical engineering technology, including free body diagram, force and moment definitions, analysis of forces on a rigid body, and a couple due to moment of a force. Students receive both lecture-based training and hands-on experience designing and constructing a model bridge from scratch by applying their knowledge on the abovementioned items. Students will be able to

- examine qualitative and quantitative treatments of forces and moments
- design trusses, construct free-body diagrams, and perform equilibrium analysis for coplanar systems.
- apply force analysis extended to beams, brackets, springs, and other commonly seen structural elements in the industry.
- work collaboratively in a team to develop, test, and optimize mechanical systems such as a truss bridge

RELATED ITEM LEVEL 2

Demonstrate Knowledge and Skills

Indicator Description:

- ETEC 3375 Statics is required for students enrolled in the Mechanical Engineering Technology program. This course addresses key concepts and skills relevant to force system analysis with application to static force analysis for mechanical systems such as a bridge
- Students are expected to achieve a 70 or higher on a scale of 100 and standard in which <60 = fail, 60 ~69 = meet minimum expectations, 70~79 = satisfied, 80~89 = good, >=90 excellent. It is expected that 80% of the students evaluated will score 70 or higher
- The overall grade for the ETEC 3375 Statics course is broken down as below.
  28 % – Chapter Tests, 28 % – HomeWorks, 14 % – Final exam, 30 % - Lab activities, 10% - extra credits
- The chapter tests, homework are evaluated through Pearson Mastering in Engineering tool. The final exam and class assignments (extra credits) are evaluated through in-person handwritten exams. Lab activities are evaluated every week through attendance, participation, and progress

Criterion Description:

Reading Assignments

These assignments are scheduled through the Pearson Mastering in Engineering tool integrated with Blackboard. A chapter or specific section will be assigned to students for their reading and help them prep for lectures, homework, and quizzes. Please note that this section doesn't carry any grades but is required for the completion of this course and grade.

Chapter Tutorials

Chapter Tutorials are followed by the reading assignments. These are interactive tutorials that will help you understand the concepts of a chapter through practice problems. Students can learn at their pace and can-do multiple retakes. There will be a slight penalty for every retake, but the best score will be retained for grading. These tutorials take an average of 3-4 hours per week to complete outside the class time.

Chapter Exams

These chapter exams are intended to test your knowledge of individual chapters. Mostly, these exams are multiple-choice questions and will be completed in 30-60 minutes.

Final Exam

The final exam will be comprehensive and based on the end chapter problems of chapters 2-4. It will consist of 9 questions from which the student has to answer any 4. There are no multiple retakes for this exam.

Lab activities

Project: Design and fabrication of a bridge with the predefined span and load requirement (Teamwork)
More detailed instructions about these projects will be available on the Blackboard. All lab activities are planned in Pirkle 100 and hence during Wednesdays, students and the instructor meet at Innovation Lab (Pirkle 100).

Class notes

The instructor will lecture in the class and demonstrate the solving procedure of problems. Students are highly encouraged to make the notes and must show them to the instructor during office hours. The instructor will verify your engagement in the course and will provide feedback.

Class Assignments

Occasionally, the instructor will give class assignments that are counted towards the 10% extra credit. This is to encourage class participation and there will be no retakes and due date extensions for any type of absences.

Findings Description:

The course provided students with the opportunity to apply their 3D design skills and force estimation technique to two real prototyping projects. The course had 23 students and their performance on various indicators is evaluated and given below.

Chapter tests

grade A - 3
grade B - 7
grade C - 7
grade D - 3
grade F - 3

Class assignments

grade A - 1
grade B - 3
grade C - 3
grade D - 2
grade F - 14

Final Exam

grade A - 3
grade B - 7
grade C - 4
grade D - 4
grade F - 5

Homework

grade A - 3
grade B - 10
grade C - 8
grade D - 0
grade F - 2

Lab activities

grade A - 23
grade B - 0
grade C - 0

grade D - 0
grade F - 0

This assessment shows that the students were performing well for hands-on activities in comparison with the theoretical assessments like class assignments and exams.

RELATED ITEM LEVEL 3

Action - Knowledge and Skills
Action Description:
Based on the assessment of ETEC 3375, more emphasis will and should be given on hands on activities. To account this, the future course structure will be more emphasized on hands on activities.

New Update to Previous Cycle's Plan for Continuous Improvement Item

Previous Cycle's Plan For Continuous Improvement (Do Not Modify):
This is a new plan for the 2021-2022 assessment cycle. No previous PCI available.

Update of Progress to the Previous Cycle's PCI:
This new degree program is being assessed for the first time for the 2021-2022 assessment cycle. No previous PCI is available.

New Plan for Continuous Improvement Item

Closing Summary:
The faculty teaching courses required by this curriculum will continue to assess the learning objectives of development and demonstration of professional communication skills and technical knowledge to ensure that all Mechanical Engineering Technology students are ready to pursue a professional career in related industries. The faculty will proactively work and support Mechanical Engineering Technology students to meet or exceed the 85% above average rating (B or higher) targeted performance criterion in the Statics and Strength of Materials courses.

Department of Environmental and Geosciences

Environmental Science BS

G1: Train Environmental Science Students to have a strong Physical Science foundation

Goal Description:

Students will develop core competencies across the disciplines of Biology, Chemistry, Geography, and Geology.

Providing Department: Environmental Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

G1 LO1 Intro Physical Science Foundation

Learning Objective Description:

Students will demonstrate proficiency in the intro physical lab science course material that serves as a foundation/pre-requisite for upper-level Environmental Science courses.

RELATED ITEM LEVEL 2

G1 LO1 ICF1 Core Physical Science Knowledge

Indicator Description:

Students will take a comprehensive exam that includes introductory (1400-level) Biology, Chemistry, Geography, and Geology concepts. This will be developed in collaboration with the Environmental Science committee that teaches the 1400-level courses required of all three Environmental Science concentrations (BIOL 1401, BIOL 1 and 2, CHEM 1411, GEOG 1401, and GEOL 1403 and 1405). Students will take the core exam toward the beginning of BIOL/GEOG 3320 that they should be enrolled in Fall of junior year.

Criterion Description:

75% of Environmental Science students will earn a 70% or higher on the interdisciplinary core physical science exam. Given student retention rates in the 70's for SHSU, it seems reasonable that 3/4 of Environmental Science students should have a C-level or better understanding of foundational concepts as they begin their advanced coursework.

Findings Description:

We are working on putting the comprehensive exam together across disciplines. The exam will be given for the first time Fall 2022.

RELATED ITEM LEVEL 3

Action - G1 Core Physical Science Knowledge

Action Description:

The comprehensive physical science exam is in development and will be given the first time Fall 2022.

RELATED ITEM LEVEL 1

G1 LO2 Advanced Physical Science Knowledge

Learning Objective Description:

Students will demonstrate proficiency in explaining concepts in the 3000- and 4000-level physical science courses that are required in each Environmental Science concentration.

RELATED ITEM LEVEL 2

G1 LO2 ICF 1 - Advanced Physical Science Concepts

Indicator Description:

Students will demonstrate knowledge of advanced physical science concepts that all three environmental science concentrations require: General Ecology; Environmental Geology; Soil Science; and one of Geomorphology OR Hydrology and Water Resources. Pooled comprehensive final exams from each of these courses will serve as the instrument.

Criterion Description:

75% of students will earn 70% or better on the comprehensive final exams in these courses. Given SHSU's retention rates in the 70's, this seems like a reasonable goal for a rigorous physical science program.

Findings Description:

This exam is in development. The proposal to add a seminar course (GEOG/GEOL 4199) was approved and will be available to teach in 2023-24.

RELATED ITEM LEVEL 3

Action - G1 Advanced Physical Science Concepts

Action Description:

The exam is being developed and will be given once GEOG/GEOL 4199 is on the books and can be offered 2023-24.

G2: Develop systems thinking

Goal Description:

Students will be able to link physical science, social science, and policy (i.e., human-environment) concepts by the time they graduate.

Providing Department: Environmental Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

G2 LO1 Linking Physical and Social Science Systems

Learning Objective Description:

Students will be able to connect physical and social science concepts by looking through a systems thinking lens.

RELATED ITEM LEVEL 2

G2 LO1 ICF1 Systems Thinking to Link Physical and Social Science

Indicator Description:

Students will be asked questions that link physical science, social science, and policy concepts in BIOL/GEOG 3320 (Sustainability and Environment) that should be taken Fall of their junior year. Similar questions will then be asked in the Applied Environmental Seminar Capstone class for last-semester seniors. In addition to BIOL/GEOG 3320, students should be taking GEOG 4331 (Conservation of Natural Resources) and POLS 3395 (Env Policy) their junior and senior year. These four courses should all help them understand the context of how physical and social science work informs policy and how policy and social factors guide the need for physical science work. The Applied Environmental Seminar will also include guest speakers that work across disciplines and at the interface of physical science and policy. The matching pre-post exam style questions will be administered at the start of BIOL/GEOG 3320 and at the end of the Applied Env Seminar.

Criterion Description:

After completing physical science, social science, and policy coursework over their junior and senior years, including an applied interdisciplinary seminar their final semester, Env Sci students will demonstrate growth in linking physical science, social science, and policy as interconnected within a larger system. 85% of seniors in the seminar course should be able to answer similar questions to those they received at the start of their junior year in BIOL/GEOG 3320 with 80% accuracy or better. These gains are reasonable to expect given the coursework required and Applied Env Seminar capstone that will review these concepts over the final semester prior to students graduating.

Findings Description:

This exam has not been given yet, as it is intended for GEOG/GEOL 4199 that was just approved this year and will begin 2023-24 once in the the catalog.

RELATED ITEM LEVEL 3

Action - G2 Systems Thinking

Action Description:

This exam has not been given yet, as it is intended for GEOG/GEOL 4199 that was just approved this year and will begin 2023-24 once in the the catalog.

G3: Proficiency in quantitative methods

Goal Description:

Students will be able to apply concepts from their required math courses to environmental problems.

Providing Department: Environmental Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

G3 LO1 Apply Quantitative Methods to Environmental Problems

Learning Objective Description:

Students will be able to use quantitative skills gained in their required statistics and/or calculus courses to work on real-world problems.

RELATED ITEM LEVEL 2

G3 LO1 ICF1 Quantitative Methods and Applied Environmental Problems

Indicator Description:

Students will be asked applied quantitative questions on comprehensive final exams in Biostatistics, Hydrology and Water Resources, Hydrogeology, and Geomorphology.

Criterion Description:

75% of students will earn a 70% or higher on quantitative-related questions across these courses. Environmental Science students need to be able to analyze numerical data, and it reasonable to expect 3/4 of juniors and seniors to demonstrate C-level proficiency of better in this area.

Findings Description:

More than 75% of Environmental Science students were able to earn C grades or higher in BIOL 4374 during Spring 2022. 100% of Environmental Science students were able to earn passing grades on the GEOG 4432 exam Spring 2022, which included 25% applied, quantitative questions.

RELATED ITEM LEVEL 3

Action - G3 Quantitative Methods and Applied Environmental Problems

Action Description:

More data will be collected across quantitative courses over 2023-24 beyond BIOL 4374 and GEOG 4432.

G4: Maintain strong interdisciplinary relationships across contributing departments

Goal Description:

The Environmental Science coordinator will continue to convene meetings with the COSET Environmental Science Committee and with dept. chairs and coordinators for contributing programs. Changes will be made as necessary given feedback from committee and contributing faculty.

Providing Department: Environmental Science BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

G4 PO1 Consistent Interdepartmental Coordination

Performance Objective Description:

The Environmental Science coordinator will meet with AG, BIOL, CHEM, GEOG, and GEOL coordinators to make sure course schedules work for Env students (i.e., limit upper-level conflicts across depts.). The Env Sci coordinator will also work to communicate with dept. chairs and coordinators to help make sure there are enough seats available to meet growing demand.

The Environmental Science committee members (a group of faculty that's been in place since 2016) will continue to meet and work together annually to make changes to the degree concentrations if issues arise.

As a result of meetings and coordination, Env Sci majors and minors will be able to get seats in all required courses as juniors and seniors.

RELATED ITEM LEVEL 2

G4 PO1 KPI1 Student Satisfaction with Interdisciplinary Degree

KPI Description:

Students will be given a survey their last semester before graduation to give feedback on any issues with the program, including scheduling, course offerings, course content, and overall satisfaction with the depts. contributing to Env Sci and the program as a whole.

Results Description:

The survey is in development, but during informal exit interviews and Spring advising, students biggest concerns were scheduling conflicts, available seats in popular courses, and the desire to make sure all required courses in the degree program clearly touch on environmental science and applied problems.

As a result of talking with students, BIOL and GEOG/GEOL updated pre-reqs to reduce registration barriers for advanced classes, including BIOL 4374, GEOG 3310, GEOG 3320, GEOG 4330, and GEOG 4432. Conversations are ongoing with PLSC re: Soils pre-req changes.

To address scheduling issues, a dept. scheduling committee was formed with member representing GEOG, GEOL, GIS, and Env Science to work with faculty and other dept. schedules to reduce conflicts when possible.

RELATED ITEM LEVEL 3

Action - G4 Student Satisfaction

Action Description:

A survey is being developed to give to students that are graduating that will focus on asking them to reflect on positives, negatives, issues, and suggestions for the program.

RELATED ITEM LEVEL 2

G4 PO1 KPI2 Meetings and Collaboration

KPI Description:

This will include a list of relevant meetings and changes and issues that arise from meetings between the Environmental Science coordinator and contributing dept. chairs and coordinators.

Results Description:

Coordinator had meetings with faculty in BIOL and AG re: ongoing pre-req issues, and multiple courses were updated to reduce student registration barriers.

Scheduling across multiple departments remains tough to reduce conflicts. However, the formation of a dept. scheduling committee is allowing Environmental and Geosciences to attempt to fit our courses around BIOL, AG, and CHSS requirements like POLS 3395.

RELATED ITEM LEVEL 3

Action - G4 Meetings and Collaboration

Action Description:

More meetings will need to be scheduled next year to updated all relevant faculty on the new assessment plan and to work on continued issues with scheduling, pre-reqs (only PLSC 3440 now), and to develop collaborative surveys and exams that are relevant across multiple disciplines in the degree.

RELATED ITEM LEVEL 1

G4 PO2 Interdisciplinary Internships

Performance Objective Description:

At least five junior and senior students will obtain internships across a range of environmental science disciplines.

RELATED ITEM LEVEL 2

G4 PO2 KPI1 Completing Internships

KPI Description:

At least 5 junior or senior students will obtain and complete relevant internships annually that relate to different areas of focus related to AG, BIOL, CHEM, or ENV and GEO disciplines. Students will be supervised by Environmental Science-related faculty that are aligned most closely with their internship focus. Five completed internship packets jointly signed by employer and advisor will indicate completion. Students will also present internship experiences to fellow students to encourage networking and demonstrate opportunities to their peers.

Results Description:

4 junior and senior Env Sci students obtained full-time paid internships for the summer. 3 opted to take credit, while 1 graduated in May. 2 other students in our dept. from GEOG and GEOL also obtained Environmental Science-related internships. So, I helped 6 total students secure internships, but missed the goal of 5 of them total being Environmental Science majors.

RELATED ITEM LEVEL 3

Action - G4 Internships

Action Description:

Given 4 internships were obtained by students for 2021-22, I will work to continue networking and push emails and announcements out to all students next year. It is possible 5 obtained internships, but only 4 have contacted me thus far. Some last year told me about their internships during the Summer only after Fall semester had started.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

The Environmental Science Committee and the Dept. will work on adapting the assessment plan as a whole for 2021-22 now that the degree is part of the Dept. of Environmental and Geosciences and Dr. Gillespie is no longer overseeing all advising and assessment of the degree. We will seek input from Env Sci faculty advisors in the dept. as well as faculty and chairs from the other contributing programs.

Update of Progress to the Previous Cycle's PCI:

This year, we re-wrote the entire Assessment plan from scratch given it's the first year the department was assessing Environmental Science and not the Dean's Office under Dr. Gillespie. We were able to get new course proposals approved and will be able to begin collecting more concrete data during 2023-24. However, it is positive that collaborations with other departments yielded some pre-req changes we've been discussing for at least two years. And our students are getting quality internship and job offers.

New Plan for Continuous Improvement Item

Closing Summary:

For 2022-23, we look forward to using this brand new assessment plan developed during the Winter of 2021-22 to determined where Environmental Science stands and what we can do to address student issues and potential shortcomings, as well as continuing to emphasize points and actions that are working well for our students.

Geographic Information Systems Certificate

Goal 1: Technical competence

Goal Description:

Impart discipline specific knowledge focused on technical competence

Providing Department: Geographic Information Systems Certificate

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Understand conceptual and technical knowledge

Learning Objective Description:

For students to be technically proficient they must also grasp the theoretical concepts.

RELATED ITEM LEVEL 2

Final Project work

Indicator Description:

Students are assigned a project in every graduate class that they must work individually and demonstrate their understanding of the course material and ability to apply those in real-world scenario.

Criterion Description:

Students work on projects in every graduate class. The final project is a key component of the final grade. Student must work with their course instructor and formulate a project plan. The final project must demonstrate a thorough understanding of concepts and techniques as evaluated by their instructor.

Findings Description:

Students worked on a final project throughout the semester and submitted a project report as well as presented their final project at the end of the semester. In case of online classes, students were required to record their presentation and submit it. We have two students in the graduate program who are pursuing a graduate GIS Certificate. All the students presented final projects at the end of the semester demonstrating a thorough understanding of course material.

RELATED ITEM LEVEL 3

Final project evaluation

Action Description:

Students pursuing a graduate GIS Certificate must be able to demonstrate technical competence in using geospatial technologies

RELATED ITEM LEVEL 1

Apply knowledge and skills in project work

Performance Objective Description:

Students will practice and demonstrate their capabilities and skills relevant to geographic information systems and science in project that simulate real world scenarios.

RELATED ITEM LEVEL 2

Final project evaluation

KPI Description:

Students must atleast earn a grade of B or higher in their final projects.

Results Description:

Students worked on a final project throughout the semester and submitted a project report as well as presented their final project at the end of the semester. In case of online classes, students recorded their presentation and submitted it. We have two students in the graduate program who are pursuing a graduate GIS Certificate. All the students presented final projects at the end of the semester demonstrating a thorough understanding of course material. One student's final project was particularly exceptional and the student earned an A grade. This student is also transitioning to the GIS Master's program in fall 2022.

RELATED ITEM LEVEL 3

Final project evaluation

Action Description:

Students pursuing a graduate GIS Certificate must be able to demonstrate technical competence in using geospatial technologies

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

We will continue to evaluate the rigor of our assessment techniques used for Certificate students. So far students in the Certificate are expected demonstrate a thorough understanding of the applied concepts of the GIS software evaluated by means of a hands-on exam and final project. Students are also encouraged to engage in research activities using GIS tools and techniques.

Update of Progress to the Previous Cycle's PCI:

Students who pursue a graduate GIS Certificate have demonstrated a thorough understanding of the GIS theories and concepts, more importantly the applications of the software. One of the students who graduated from the certificate program will be transitioning into the GIS Master's program in fall 2022 and the other student is employed in geospatial industry.

Plan for Continuous Improvement Item

Closing Summary:

We will continue to evaluate the rigor of our assessment techniques used for Certificate students. So far students in the Certificate are expected demonstrate a thorough understanding of the applied concepts of the GIS software evaluated by means of a hands-on exam and final project. Students are also encouraged to engage in research activities using GIS tools and techniques. Students pursuing a certificate are held to the same rigorous standards as those in the Master's program. They must not only demonstrate hands-on skills using geospatial technology but also demonstrate a good understanding of the theories and principles.

Students pursuing a graduate GIS Certificate will also be encouraged to consider transitioning to the Master's program, if interested.

Geology BS

Goal 1: Basic skills for geology majors

Goal Description:

Deliver basic skills that geology majors will need to be successful in their subsequent coursework.

After our success in developing a field methods course (GEOL 3301) that does an excellent job of preparing our students for their capstone summer field camp we decided to assess the entire curriculum in terms of student preparation starting with the most basic skills and eventually working our way toward the advanced skills.

Providing Department: Geology BS

Progress: Draft

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 1 Objective 1: Apply Basic Skills Required of a Geology Major

Learning Objective Description:

Students completing the introductory geology courses will demonstrate an understanding of the basic skills required of a geology major to succeed in subsequent coursework.

This is where we want to assess how well we are training students to develop necessary basic skills. We are using student performance for the assessment, but we are really experimenting to find ways to improve our training methods.

RELATED ITEM LEVEL 2

ICF Goal 1 Objective 1: Basic Geology Skills Evaluation

Indicator Description:

All students enrolled in Physical Geology complete two practical exams that measure their ability to apply basic geological skills such as observing mineral properties necessary for mineral identification and being able to read maps and make geological interpretations based on map observations. Certain embedded questions, samples, or problems will be evaluated to measure student performance on specific basic skills.

Criterion Description:

At least 70% of the students will be able to perform 70% of the required skills in the embedded questions, samples, or problems. The remaining 30% of the students will be able to perform 50% of the required skills.

Findings Description:

Below is an example of what we have done in the past. Because of COVID we had to reformat the exams and were unable to obtain comparable information. We had to reformat the entire lab so that even the instruction does not compare to what we did previously. Note in the description below that the information is based on in-person practicals.

On the rock and mineral practical we embedded samples where students had to determine mineral cleavage, a basic skill for identifying minerals. We did this because we had the sense that students were having difficulty determining mineral cleavage and wanted to try measuring their ability to do so. 46% of the students were able to determine the mineral cleavage correctly 70% of the time or better. This is up from last year's 35%. And 23% of the students were able to determine the mineral cleavage less than 50% of the time. Compare this to 45% last year.

On the rock and mineral practical we also embedded samples where students had to determine the texture of an igneous rock, a basic skill for classifying igneous rocks. We had noticed students having issues with this concept, but wanted to get a quantitative measure of student skill levels. Only 31% of the students were able to determine the appropriate texture correctly 70% of the time or better. Compare this to 45% last year. 38% were only able to determine the appropriate texture correctly 50% of the time. Compare this to 45% last year.

On the map skills practical we embedded questions regarding the use of basic coordinate systems. We had observed that students seem to be having difficulty stating locations using various coordinate systems. 67% of the students were able to determine location coordinates correctly 70% of the time or better. Compare this to 0% last year. 22% were only able to determine the correct coordinates 50% of the time. Compare this to 44% last year.

On the map skills practical we also embedded questions where students had to make a geological interpretation based on map observations. Students always seem to struggle with this, but we had not previously quantified their struggle. Only 33% of the students were able to make a correct geological interpretation based on map observations 70% of the time. Compare this to 22% last year. 33% were only capable of making the correct geological interpretation 50% of the time. Compare this to 11% last year.

RELATED ITEM LEVEL 3

ICF Goal 1 Objective 1: Basic Geology Skills Evaluation

Action Description:

2020-2021: Similar to 2019-2020. Still trying to sort out practical formats and how to obtain the information we want from exams on Blackboard. It can be done, but much more labor intensive than getting the information by going through a pile of papers. Our "action" going forward is still along the lines of what is described in the 2018-2019 action. A "silver-lining" to the COVID reformat is a video describing physical properties such as mineral cleavage which generated positive anecdotal responses from students. Students claimed that the video (by Brian Cooper) helped them better visualize and recognize the various types of mineral cleavage.

2019-2020: Below is last year's action. Due to COVID-19, we have had to totally restructure our lab course and have not figured out yet how we will be doing practical exams in order to assess the skills in question.

2018-2019: We will continue with the embedded question format of evaluating specific basic geology skills in the introductory courses. This method provides information that can be used to change our classroom methods for teaching various basic geology skills. The plan is to start with the most basic skills, then look at higher level skills and application of entire sets of skills. This process was initiated when we looked at the success of the field methods class in preparing students for the capstone summer field camp. We realized there was a need to improve student

preparation in prerequisite coursework after observing student performance in the field methods course.
This year we realized that our sample size still needs to be increased. For example, even though we did change the way in which cleavage is taught in the lab, the ability of students to correctly recognize the type of cleavage only improved slightly (from 35% to 46%). Why? Most likely because we only sampled two labs, and both labs had fewer than 20 students. Still not a statistically representative sample. Plus the labs we chose had lower exam averages than a number of the other labs.
The plan this year is to again look at a larger sample during the fall, then introduce a new teaching technique and re-evaluate with a sampling during the spring. Last year students studied ideal cleavage forms and compare those to mineral examples. This year we will include measuring cleavage angles.

Goal 2: Development Of A Geologic Knowledge Base

Goal Description:

Each student is required to have developed a level of knowledge above and beyond the basic skills in various areas of geology prior to attending the capstone geology field course.

This is the follow-on to Goal 1 where advanced skills are to be assessed.

Providing Department: Geology BS

Progress: Draft

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 2 Objective 1: Mineral Recognition

Learning Objective Description:

After completing Geology 3404, students will be able to recognize minerals. Every geology student must take Geology 3404, Mineralogy. One of the objectives of this course is to be able to recognize minerals, which is a skill that will be needed when they take the capstone geology field course. This requires that the students be familiar with the physical properties of minerals.

RELATED ITEM LEVEL 2

ICF Goal 2 Objective 1: Final Mineral Practical Exam

Indicator Description:

Students completing Geology 3404, Mineralogy, must take a final practical exam that requires the recognition of minerals. The recognition process requires an understanding of the physical properties of minerals.

Criterion Description:

60 percent of the students will be able to recognize 15 or more of the 30 minerals presented to them on the final mineral practical. This year's exam will serve as a baseline for measuring student success in regard to using the physical properties of minerals in order to identify the mineral correctly.

Findings Description:

See previous results below. In 2020, 6 out of 9 (67%) were able to recognize 15 or more of the 30 minerals presented to them. The small number of students made the mineral cleavage and mineral formula observations even more statistically insignificant than usual.

Overall practical exam results (2019): 23% of the students (8 out of 35) were able to recognize 15 or more of the 30 minerals presented to them on the final mineral practical. Compared to: 2018 = 18%, 2017 = 53%, 2016 = 52%, 2015 = 79%, 2014 = 90%, 2013 = 70%, 2012 = 57%.

Results comparing 2017 to 2016 are given below. 2019's and 2018's results were so bad (per results above) that they are not really meaningful, other than inspiring some major changes to the class in 2020. There seems to be an improvement, but again the numbers are pretty small and are not statistically significant.

We embedded 8 questions on the final mineralogy practical where students had to determine mineral cleavage, a basic skill for identifying minerals. The students correctly determined the cleavage 61.7% of the time on average. 58.5% last year (41% in 2019). Individual minerals ranged from 29% to 93% correctly determined cleavages. (30% to 87% last year) (0% to 58% in 2019)

We embedded questions on the final mineralogy practical where students had to provide the mineral formula for the sample they were observing. Knowing the composition of the mineral is useful information when trying to determine the minerals in a rock sample since many minerals in a rock sample will have similar compositions. The students provided the correct formula 40% of the time on average. (55% last year) (did not calculate percentage for 2019...less than 50% just glancing at all the scores)

For 2020, there were embedded questions regarding rock-forming minerals. 8 out of 9 missed both plagioclase and augite. 7 out of 9 missed hornblende. 4 out of 9 missed potassium feldspar and quartz. Only one out of 9 missed olivine.

RELATED ITEM LEVEL 3

ICF Goal 2 Objective 1: Final Mineral Practical Exam

Action Description:

We will continue the trend that began with the Fall 2019 Mineralogy class, i.e. a greater emphasis on mineral identification and recognition. The goal here is to better prepare students for Petrology, Field Methods, and Summer Geology Field Camp. We will continue to use a similar approach used in the introductory courses to evaluate very specific skills by using embedded questions in the practical exams. This will help us understand which specific mineral recognition skills are causing the most problems and then we can develop teaching methods to address those problem areas. The Fall 2020 mineralogy class was taught in a Hybrid format, and some interesting new resources were discovered online and with the ability to make videos explaining various lab procedures. The plan is to make greater use of these resources going forward and assess the learning outcomes with the practical exams. We also examined the Fall 2020 mineralogy class's ability to recognize rock-forming minerals. The observations indicate more work is needed on this very important group of minerals to better prepare the students for Petrology.

Goal 3: Sufficient Knowledge Of Geology To Qualify For A Bachelor Of Science

Goal Description:

Students will acquire a comprehensive knowledge of the discipline that encompasses both theoretical and field-based practical skills.

Providing Department: Geology BS

Progress: Draft

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Goal 3 Objective 1: Successful Completion Of An Externally Evaluated Geology Field Camp

Learning Objective Description:

All SHSU Geology majors must attend a six credit, externally evaluated capstone Field Camp as a required component of their degree program. Such field camps are typically open to suitably qualified upper level students from geology programs situated anywhere in the country. They are conventionally evaluated using a letter grade system which the Department of Geography and Geology converted to a ranking system.

SHSU Geology students must be nationally competitive at this capstone task as indicated by at least 60% of our participants achieving at least a Limited Mastery ranking.

RELATED ITEM LEVEL 2

ICF Goal 3 Objective 1: Successful Completion Of Field Camp

Indicator Description:

All students must attend a six credit hour Field Camp that is externally evaluated on the following basis: Mastery, Limited Master, Adequate Comprehension, Limited Comprehension, and Very Low Comprehension. Students are free to choose from a very wide range of applicable courses, each of which offers slightly different emphases in terms of geographical location and course structure. ALL courses offer a capstone-like review with Mastery reflecting mastery of taught and examined modules as well as high levels of precision in final field review stand-alone projects. A ranking of Limited Mastery reflects mastery of one or more modules but with some imprecision; a ranking of Adequate Comprehension reflects broad comprehension but demonstrates a lack of sophistication in the use of basic course material; rankings of Low Comprehension and Very Low Comprehension reflect low levels of understanding and effort and indicate inappropriate general preparation prior to field camp participation.

Criterion Description:

60% of students will achieve at least a limited mastery ranking or better by the external evaluator of the Field Camp.

Findings Description:

Just like last year (2020, see below), except this year (2021) University of Missouri Branson Field Camp did not take students from other universities so we were unable to get any feedback this year. Students did go to other field camps, but no more one or two per field camp so there was not a large group to evaluate. Anecdotally, our students reported that they excelled in their respective field camps and that their field camp instructors were impressed by their performance. But no actionable data was generated this year.

University of Missouri Branson did not have a Field Camp this year. So, our normal source of feedback regarding our student's ability in field methods cannot provide any information.

RELATED ITEM LEVEL 3

ICF Goal 3 Objective 1: Successful Completion Of Field Camp

Action Description:

Last year's (2019-2020) plan of action still pertains...especially the last sentence.

Our response to the feedback from students and field camp directors over the past number of years was to develop our own introductory field methods course. That course has now been offered seven times, with the most recent five offerings including two faculty members. The feedback from students and field camp directors regarding this course has been extremely positive. There is not much more we can do to improve the introductory field methods course. However, now we are looking at ways to improve student preparation for the introductory field methods course. So far we have only focused on a few basic geology skills in the introductory geology courses and mineral recognition in the mineralogy course. We plan on expanding on this type of assessment.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

Again, progress is being made, but we are definitely still in the development stage for a number of these assessment processes. We will make use of the many new resources that were discovered as a positive result of having to teach remote and hybrid courses. There will be a new Physical Geology lab coordinator starting this year, so I am not sure whether he will continue using pre-labs or not. The field methods course continues to be a success based on the informal feedback that we have received from students and summer field camp directors. Still working on getting more faculty involved in this assessment process. Committees were set up but did not meet because everyone was scrambling to deal with changes associated with COVID. Hopefully things will start to return to normal.

Update of Progress to the Previous Cycle's PCI:

Again, we will continue with the embedded question format of evaluating specific basic geology skills in the introductory courses. This method provides information that can be used to change our classroom methods for teaching various basic geology skills. The plan is to start with the most basic skills, then look at higher level skills and application of entire sets of skills. This process was initiated when we looked at the success of the field methods class in preparing students for the capstone summer field camp. We realized there was a need to improve student preparation in prerequisite coursework after observing student performance in the field methods course.

Last year we realized that our sample size still needs to be increased. Unfortunately, things went south this year and we were unable to implement our plans for the year. Although, the major changes in instruction did seem to offer some new methods. Again, the plan this year is to look at a larger sample, then introduce new teaching techniques and re-evaluate with a sampling during the spring. We are still experimenting with the use of pre-labs to help lab instructors evaluate student preparedness coming into any particular lab. We are putting the pre-labs on Blackboard. The plan did not work very well in the past because there was a very large DFW rate. An anomalously high rate. Still working on finding a solution to the normalization plan. So far we are just trying to determine which skills appear to be most problematic. The next step is to change up the instruction. That has started with the Fall 2020 mineralogy class. This sounds strange, but a greater emphasis is being placed on mineral identification and recognition than in previous classes. This requires some material regarding crystallography to be put on Blackboard as videos to save time during class to work with minerals.

Our response to the feedback from students and field camp directors over the past number of years was to develop our own introductory field methods course. We did not offer field methods this year, but as of last year that course has now been offered seven times, with the most recent five offerings including two faculty members. The feedback from students and field camp directors regarding this course has been extremely positive. There is not much more we can do to improve the introductory field methods course. However, now we are looking at ways to improve student preparation for the introductory field methods course. So far we have only focused on a few basic geology skills in the introductory geology courses and mineral recognition in the mineralogy course. We plan on expanding on this type of assessment. There is a need to get all faculty involved in this assessment process, and that was initiated last fall by setting up committees to help with the assessment process.

New Plan for Continuous Improvement Item

Closing Summary:

Again, progress is being made, but we are definitely still in the development stage for a number of these assessment processes. We will make use of the many new resources that were discovered as a positive result of having to teach remote and hybrid courses. There will be a new Physical Geology lab coordinator starting this year, so I am not sure whether he will continue using pre-labs or not. The field methods course continues to be a success based on the informal feedback that we have received from students and summer field camp directors. Still working on getting more faculty involved in this assessment process. Committees were set up but did not meet because everyone was scrambling to deal with changes associated with COVID. Hopefully things will start to return to normal.

Department of Mathematics and Statistics

Mathematics BA/BS

Deliver An Upper-Level Curriculum With Appropriate Discipline Specific Knowledge

Goal Description:

The curriculum will address the discipline specific knowledge dictated by professional societies and/or professionals in the workforce for upper-level instruction in mathematics.

Providing Department: Mathematics BA/BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Advanced Areas For Majors

Learning Objective Description:

Students preparing to graduate will demonstrate advanced mathematics knowledge and skills.

RELATED ITEM LEVEL 2

Euclidean Geometry Project (BA) - Math 3363

Indicator Description:

Students will complete a project on the role of proof and technology in communicating mathematics.

Criterion Description:

At the end of the semester, 70% of the students submitting their project will receive a rating of 60 or better (out of 75) according to the attached rubric.

Attached Files

Project description and rubric

Findings Description:

The file Ch12Project.pdf describes the project on page 1 and includes the scoring rubric on page 2. These files are attached.

The total possible for this assignment was 75 points. Students could earn extra points by exceeding expectations in some categories. The overall scores for the students using this rubric are as follows:

60, 61, 71, 73, 75, 75, 75, 78, 80, 81, 82, 83, 84, 84

Of the 14 students, 14 out of 14 (100%) scored 80% or better on the project. 10 out of 14 (71%) scored 100% or better.

Attached Files

Ch12Project.pdf

RELATED ITEM LEVEL 3

Euclidean Geometry Projects (BA) - Math 3363

Action Description:

As 100% of the students met the criteria, we will at a minimum maintain this expectation. In the coming year, we will review the rubric to see if there are places to increase the rigor of the assignment. With several students scoring 100% or more, we may wish to revise the rubric. For example, we may change the rubric so that students are not able to score above 100%.

RELATED ITEM LEVEL 2

Introduction to Math Thought portfolio (BS) - Math 3300

Indicator Description:

Students will demonstrate the ability to write direct proofs, proofs by contrapositive, proofs by contradiction, proofs by induction, and proofs by cases.

Criterion Description:

At the end of the semester, students will turn in a portfolio of rewritten past work (or similar) that demonstrates their ability to write each of the five types of proofs listed above. At least 70% of students who turn in portfolios will earn a combined average of at least 75% on these five types of proof in their portfolios.

Findings Description:

In the Fall 2021 semester, 21 students turned in portfolios. The 5 types of proof mentioned in the criterion description accounted for 62.5% of the portfolio score. The combined average on these 5 types of proof was 89.6%.

Student scores on these 5 types of proof totaled

37.5, 39.5, 44, 50, 51.5, 52, 52.5, 54.5, 58.5, 58.5, 58.5, 60.5, 62.5, 62.5, 62.5, 62.5, 62.5, 62.5, 62.5, 62.5, 62.5, 62.5,

with 62.5 being the maximum possible. A combined average of 75% on these types of proof corresponds to a score of 46.875 on these types of proof. Therefore, 18/21 (85.71%) students earned a combined average of at least 75% on these 5 types of proof, while 3/21 (14.29%) did not.

RELATED ITEM LEVEL 3

Introduction to Math Thought portfolio (BS) - Math 3300

Action Description:

The success rate on the portfolio's in Math 3300 (85.71%) was very good. However, we will continue to try to improve on this success rate going forward.

RELATED ITEM LEVEL 2

Undergraduate Research Project (BS) - Math 4395

Indicator Description:

Undergraduate math majors will enroll in Math 4395 in which students perform a semester-long research project (along with discipline-specific professional development activities) with a faculty mentor.

Criterion Description:

At least 10% of our undergraduate math majors per year will enroll in Math 4395 and complete a research project with a faculty mentor.

Findings Description:

This course did not run during this cycle.

RELATED ITEM LEVEL 3

Undergraduate Research Project (BS) - Math 4395

Improve Communication Between Department And Its Majors

Goal Description:

Communicate to our mathematics majors more and better information pertaining to internships, research opportunities, scholarships. etc.

Providing Department: Mathematics BA/BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Improve Communication Between Department And Mathematics Majors

Performance Objective Description:

Communicate to our mathematics majors more and better information pertaining to internships, research opportunities, scholarships. etc.

RELATED ITEM LEVEL 2

Annual meeting with math majors and social media outreach

KPI Description:

In each late Fall semester, a meeting will be held, hosted by the department chair. All mathematics majors will be invited. This one hour meeting will include an introduction of all faculty in the department (via projected slides), a description of some of the research areas in the department (particularly those that have involved students), and a list of opportunities available to our majors.

These opportunities might involve departmental scholarships and awards, employment opportunities, and conferences available for travel. In addition, we will describe REUs (those both local and external) to the students and encourage students to apply.

The purposes of these meetings are (1.) to inform students of opportunities in the department, (2.) to recruit math majors into our stat minor program, and (3.) to foster a sense of belonging in the department of each one of our mathematics majors.

Results Description:

The Department hosted a virtual Majors & Minors Meeting in September 2021. 35 students attended. By way of comparison, 17 students attended in September 2020.

Since June 2021, we have used the Department’s social media account on Twitter (@SHSU_Math_Stat) to post 42 different messages. These have included information related to registration, the Majors & Minors Meeting, giveaways, and celebrations of the accomplishments of students and faculty. The Twitter account is also used to retweet information related to campus events, deadlines, and other items of interest from other official SHSU accounts and the occasional retweet of a mathematical observation from an interim chair.

We also use the digital sign by the elevators to communicate announcements with our majors and minors.

RELATED ITEM LEVEL 3

Annual meeting with all math majors and social media outreach

Action Description:

Only 35 students attended our Fall 2021 meeting. By way of comparison, this is an improvement on Fall 2020 when only 17 students attended. We have over 100 majors, so having only one event where 1/3 of them attend is not sufficient. Because these meetings were virtual due to the pandemic, we feel that attendance will improve as we revert back to face-to-face meetings. Also, our social media is not necessarily targeted to majors and minors, but we are making efforts to improve that.

Increase student success and academic preparation in Math 1420 and Math 1430.

Goal Description:

Improve attrition rates in the calculus sequence.

Providing Department: Mathematics BA/BS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Foundation Areas - Differential Calculus

Learning Objective Description:

Students will demonstrate the following knowledge and skills: differentiation of standard mathematical functions, application of the Fundamental Theorem of Calculus to the evaluation of integrals, a broad understanding of integration techniques, using calculus techniques to solve optimization problems, and convergence properties of infinite sequences and series.

RELATED ITEM LEVEL 2

Assessment in Math 1420 and Math 1430

Indicator Description:

Create assessment portfolios that can be used in active learning sections of Calculus I and Calculus II to better align the way that we assess our students in these courses.

Criterion Description:

Active learning in Math 1420 and Math 1430 will use a wide variety of assessment strategies which may include group and individual projects, informal student presentations, exams with group and individual portions, techniques from mastery-based assessment, and more. In particular, each learning objective will correspond to multiple items in the assessment portfolio to provide a broad picture about student mastery or proficiency

Findings Description:

Math 1420 was not assessed, instead Math 2440 was assessed.

Math 1430 section I: the student portfolios have two main components: "Group HW assignments" which are written problem sets that are started in class and completed outside of class, and "Study Guides" (attached here) which are documents that the students create in advance of their assessments. For Spring 2022, 23 students were enrolled at the end of the semester, but 4 of those had not engaged in any coursework since Spring Break. Of the 19 students who submitted portfolios, 17/19 earned a grade of C or better.

Math 1430 section II: students created video portfolios for each set of Block Objectives. The main difference is that instead of the submission being a written study guide (as described above), the students had to record a video of themselves actually presenting solutions to problems to demonstrate their mastery of each objective. In Fall 2021, the expectations were trimmed down to just two video portfolios instead of four (one on techniques of integration, one on infinite series tests) and the students were evaluated well before the midterm/final exam so that the feedback could help them prepare for the exams. That class (Fall 2021) was fully online. A rubric was built in Blackboard to formalize that evaluation and specific notes were added for each student.

MATH 2440: students create a video portfolio at the end of the semester as part of their review process before the final exam. Prior performance from each block of material (Vector Functions, Partial Derivatives, Multiple Integrals) was reviewed to find where each student struggled. Each student was then provided with a list of 5 objectives customized for them, and they chose problems to illustrate how they corrected past mistakes to better understand each one.

Attached Files

Math 1430 Assessment.pdf

RELATED ITEM LEVEL 3

Assessment in Math 1420 and Math 1430

Action Description:

The data collected in Math 1430, section II is being used as a starting point to assemble some data about video portfolio assessment in calculus.

The data collected in Math 2440 from Spring 2021, Spring 2022, and upcoming data in Spring 2023 will be used to measure how effective this form of assessment is for multivariate calculus.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

The mathematics department will continue to focus on improving curriculum and communication with our majors. The current curriculum focus involves coordination among faculty engaged in active learning strategies and these faculty members will continue to investigate strategies to improve student success. Communication with our majors will be coordinated by both math department faculty and staff.

Update of Progress to the Previous Cycle's PCI:

We have included the counterpart to the BA side the learning objective "Advanced Areas For Majors" (which is Euclidean Geometry Project (BA) - Math 3363) by adding the new indicator "Introduction to Math Thought portfolio (BS) - Math 3300" to address the BS side of the learning objective "Advanced Areas For Majors". Our social media outreach has been improved as we communicate with students through not only our Facebook page, but also now our department twitter account.

All students in MATH 3363 students scored 60 or more points out of 75 on the Euclidean Geometry Project. This is well above the criterion of 70% of the students scoring at that level. We will retain this project and review (and potentially revise) the criterion and the rubric to maintain student success.

New Plan for Continuous Improvement Item

Closing Summary:

A major focus this coming academic year is to implement a writing assessment for our majors which will be

1) from a writing enhanced course that is required for the BA/BS Math programs,
2) will contain actual English sentences and paragraphs and not simply mathematical symbols,

3) will give the students an opportunity to submit a revision based on instructor feedback,
4) will be collected (final draft) from our upper division undergraduate mathematics majors at least once a year.

This assessment will directly address the goal that "students preparing to graduate will demonstrate advanced mathematics knowledge and skills."

The math area plans to collect this assessment in Math 4377 (Algebraic Structures) in Spring and Fall of each year as part of a student's homework assignment portfolio.

Regarding the Euclidean Geometry Project, we will review and potentially revise the project rubric and criterion to build on the outstanding performance of students on this project during this assessment cycle.

Mathematics MA

Deliver A Curriculum With Appropriate Discipline Specific Knowledge

Goal Description:

The curriculum will address the discipline specific knowledge dictated by professional societies and/or professionals in the workforce.

Providing Department: Mathematics MA

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Understanding Mathematical Structures

Learning Objective Description:

Students will prove theorems or solve problems or explain concepts in the following core areas

- abstract algebra structures such as groups, rings, fields, functions, homomorphisms, and isomorphisms.
- differential and integral calculus
- probability and statistics, particularly inferential statistics, and
- transformational geometry to include isometrics and non-isometric transformations such as circles of inversion.

RELATED ITEM LEVEL 2

MA Comprehensive Oral Examination

Indicator Description:

Students in the MA program will take an oral examination over the four areas covered in the objective. The oral examination will be scored by a committee of faculty using a rubric developed and approved by department faculty.

Criterion Description:

100% of the MA students will receive a grade of "Pass" or "High Pass" on each of the four areas according to the attached rubric.

Attached Files

Grading Scheme for MA Orals.pdf

Findings Description:

During Fall 2021 four students participated in their oral comprehensive exams. Of these four, three passed all four subjects on the first try. Of these three, Algebra had 3 passes, Geometry had two passes and one high pass, Analysis had three passes, and Prob/Stats had two passes and one high pass. The fourth student passed Analysis the first time but needed to retake Algebra and Geometry a second time before passing, and Prob/Stats a third time.

In Spring 2022, three students participated in their oral comprehensive exams. Of these three, two passed all four subjects on the first try. Of these two, Algebra had one pass and one high pass, Geometry had one pass and one high pass, Analysis had one pass and one high pass, and Prob/Stats had two passes. The third student passed Analysis and Prob/Stats the first time but needed to retake Geometry a second time before passing, and is scheduled to retake the Algebra portion Summer 2022.

In addition, the prob/stats professor suggested a new oral comprehensive rubric which she began piloting with students in Spring 2022. It is attached here for reference.

Attached Files

Prob_Stats Comp Rubric.pdf

RELATED ITEM LEVEL 3

MA Comprehensive Oral Examination Action

Action Description:

During Fall 2022, we will have 1 students participate in their oral comprehensive exams. During Spring 2023, we will have 3 students participate. During Summer 2023, we will have 2 students participate. During the 2022-23 year we will revisit our procedures for oral comprehensive exams. In the 2023-2024 academic year, we anticipate conducting 10 exams (8 of these during Spring 2024). This is quite large and very demanding on faculty's time. We will discuss if we should move to a hybrid written/oral exam as the program grows. We will also revisit the rubric for the exam.

RELATED ITEM LEVEL 1

Develop 100% Online MA Program

Performance Objective Description:

Work on transitioning Special Topics Courses to regularly offered courses.

RELATED ITEM LEVEL 2

Submit Form B's to turn special topics courses into permanent courses

KPI Description:

Form B for Concepts in Linear Algebra, Intro to Analytical Statistical Techniques for Educational Research, and Advanced Mathematical Problem Solving (Summer 2022).

Form B's will be submitted following this timeframe:

- Concepts in Linear Algebra (by the end of Spring 2022)
- Intro to Analytical Statistical Techniques for Educational Research (by the end of Summer 2022)
- Advanced Mathematical Problem Solving (by the end of Summer 2022)

Results Description:

Form B's for Concepts in Linear Algebra and Advanced Mathematical Problem Solving were both submitted and approved by the University Curriculum Committee (UCC) in Spring 2022. The new catalog number for Concepts in Linear Algebra is MATH 6387 and the new catalog number for Advanced Mathematical Problem Solving is MATH 6385. The Statistics course (the name is being revised) was submitted in Spring 2022 but the

(UCC) needed more information so the Form B will be revised according to their comments and resubmitted by the end of the Summer 2022 which was the original plan anyway.

RELATED ITEM LEVEL 3

Submit Form B's to turn special topics courses into permanent courses Action

Action Description:

During the 2022-23 year, we will submit a revised Form B for Special Topics Course (MATH 5360) Quantitative Research in Education (this title may be revised) as we continue to round out the elective courses for the 100% online MA program.

RELATED ITEM LEVEL 1

Program Evaluation

Performance Objective Description:

Begin to develop a plan to be able to evaluate the effectiveness of the Mathematics MA program.

RELATED ITEM LEVEL 2

Alumni Formal Assessments of MA Program

KPI Description:

Create and update two SHSU MA Alumni email lists. One will be of SHSU emails and one will be of personal emails collected as students graduate. Over time this should allow program administrators to effectively contact alumni for program evaluation purposes.

The MA graduate coordinator will create and manage the two email distribution lists with initial creation and population of both lists by Spring 2022.

Results Description:

The MA graduate coordinator created and is currently managing the two email distribution lists as of Spring 2022. This effort will continue as the program grows.

RELATED ITEM LEVEL 3

Alumni Formal Assessments of MA Program Action

Action Description:

To move forward in our Alumni Formal Assessments of MA Program, the next step to be taken will be to continue to collect personal email addresses of our graduates as part of a distribution list of MA Alumni in order to send out a survey to assess the effectiveness of the MA program at a future date.

RELATED ITEM LEVEL 1

Refine and implement an effective marketing strategy to increase enrollment

Performance Objective Description:

During the 2021-2022 academic year, we will continue to refine and implement the marketing plan developed during the 2020-21 academic year for the 100% online MA program.

RELATED ITEM LEVEL 2

Implement Marketing Plan

KPI Description:

By the end of Spring 2022, we will have begun to implement the revised Math MA marketing plan.

We will specifically ensure the MA websites are prepared to optimize search engine's abilities to find us. We will begin to target potential students using a combination of 80% search engine optimization and 20% social media advertisement based on on our initial funding.

(in Fall 2022 we will evaluate the effectiveness of our plan by obtaining data on the number of positive search engine searches, the number of social media clicks, and the number of inquiries and applications for the Math MA program compared to Fall 2021.)

Results Description:

The marketing plan was initiated in Spring 2022. It has resulted in four new students starting in Summer 2022 and three enrolled new students for Fall 2022 with an expected 4-6 more applications coming as of May 2022. In the Fall of 2022, we will do another analysis of the final data associated with this year's marketing plan to put together revisions for the next marketing plan.

RELATED ITEM LEVEL 3

Implement Marketing Plan Action

Action Description:

To further market the 100% online MA program, we will request $2000 from the department to fund a continued marketing campaign going into Fall 2022 and Spring 2023. We will tweak what we learned from the last marketing campaign. If the department would support this, we would then request $2000-$3000 each from COSET and the School of Graduate Studies. The goal is to have an eventual enrollment of at least 30 students with a possibility of up to 45.

RELATED ITEM LEVEL 2

Refine marketing plan for the 100% online MA program

KPI Description:

By January of 2022, the graduate advisor for the MA program will meet with SHSU marketing to refine the marketing plan based on the 2020-21 results and meet with the chair of the math/stats department, the dean of COSET, and the dean of the Graduate School to solicit funding to support the refined marketing plan.

By January 2022 there will be:

1. a refined marketing plan for the MA program
2. at least 1 meetings with SHSU marketing
3. at least one meeting with the chair of the MATH/STAT department to solicit department funding

4. at least one meeting with the dean of the COSET to solicit college funding
5. at least one meeting with the dean of the Graduate School to solicit additional funding

Results Description:

By January 2022, the MA program coordinator met all 5 actions to refine the MA marketing plan. the plan was then implemented in March of 2022.

RELATED ITEM LEVEL 3

Refine marketing plan for the 100% online MA program Action

Action Description:

We will tweak what we learned from the last marketing campaign. We will examine the click data provided from the SHSU marketing department to better understand how to target our marketing efforts more effectively and implement this revised strategy during our next marketing campaign, Spring 2023.

Develop Research Skills

Goal Description:

Students will develop research skills commensurate with graduate student status.

Providing Department: Mathematics MA

Progress: Completed

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Demonstrate Research Skills

Learning Objective Description:

Students completing the MA in Mathematics will demonstrate research skills by successfully completed Math 5380 with an advisor.

RELATED ITEM LEVEL 2

Research Project Assessment

Indicator Description:

MA students complete an independent research project. The student works with a supervising professor who oversees and evaluates the work required of the student. A grade is assigned based on the individual requirements set forth by the supervising professor.

Criterion Description:

Students will be rated at least 80% on the project rubric. Each student will be evaluated on an individualized rubric by their supervising professor.

Findings Description:

During Fall 2021, one student completed their Capstone course successfully. During Summer 2022, one student completed their Capstone course successfully. During Summer 2022, there are four students working on their capstone projects (the most the program has ever had at one time!)

With the growth of the MA program, a better way of preparing students for the capstone project was developed as part of the MATH 6385 (Advanced Mathematical Problem Solving) course Form B process. The description of this course is as follows: Students study advanced mathematical problem-solving processes and strategies and practice their learning by solving real-world problems to prepare them for their individualized end-of-program capstone research projects. Students will explore how to design, conduct, carry out, and report on a problem-solving project in a selected content area. Topics may include advanced concepts in algebra, geometry, financial mathematics, and calculus, including functions, graphs, complex numbers, and number systems.

This course will be taught for the first time during Summer 2022 as a MATH 5360 Special Topics course. It is hoped this will be a step forward in increasing the rigor and usefulness of the project to the MA students.

RELATED ITEM LEVEL 3

Research Project Assessment Action

Action Description:

During 2022-2023 we anticipate 7 students completing research projects (1 in Fall 2022, 4 in Spring 2023 and 2 in Summer 2023). We will evaluate the effectiveness of MATH 6385 in better preparing students for MATH 5380.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

Building on the success of the 2020-21 year, we plan to work on improving during 2021-22 in the following ways:

1. To move forward in our Alumni Formal Assessments of MA Program, the next step to be taken will be to create a distribution list of MA Alumni in order to send out a survey to assess the effectiveness of the MA program.
2. To further market the 100% online MA program, we would like to request another $2000 from the department to fund an even more robust marketing campaign going into Fall 2021 and Spring 2022. We will tweak what we learned from the last marketing campaign to funnel a higher proportion of the funds to the Google Ads since this gave us a bigger bang for our buck. If the department would support this, we would then request a matching $2000 each from COSET and the School of Graduate Studies. There is no reason the MA program could not have 2-3 times the enrollment we currently have without an increase in faculty. All we need is better online advertising to make this happen.
3. During Fall 2021, we will have 5 students participate in their oral comprehensive exams. During Spring 2022, we will have 2 students participate. This is the largest number we've ever needed to facilitate in a single year.
4. During 2021-2022 we anticipate 7 students completing research projects (1 in Fall 2021, 1 in Spring 22 and 5 in Summer 2022). This is the most we've ever had before in a single year.
5. During the 2021-22 year, I will ask the Math/Stats department policy committee to continue work on a COSET aligned policy.
6. During the 2021-22 year, we will next submit Form B's for Special Topics Courses (MATH 5360) Concepts in Linear Algebra and Introduction to Analytical Statistical Techniques for Educational Research as we continue to round out the elective courses for the 100% online MA program.

Update of Progress to the Previous Cycle's PCI:

Summary of work done to improve during the 2021-2022 year:

1. To move forward in our Alumni Formal Assessments of MA Program, the next step to be taken will be to create a distribution list of MA Alumni in order to send out a survey to assess the effectiveness of the MA program.
    - This was completed as planned.
2. To further market the 100% online MA program, we would like to request another $2000 from the department to fund an even more robust marketing campaign going into Fall 2021 and Spring 2022. We will tweak what we learned from the last marketing campaign to funnel a higher proportion of the funds to the Google Ads since this gave us a bigger bang for our buck. If the department would support this, we would then request a matching $2000 each from COSET and the School of Graduate Studies. There is no reason the MA program could not have 2-3 times the enrollment we currently have without an increase in faculty. All we need is better online advertising to make this happen.
    - This was completed at planned with the exception that we received $1000 from the department instead of $2000. We have seen the program grow by 7 students (4 in Summer 2022 and 3 so far for Fall 2022) while only graduating 2 in Fall 2021 and Spring 2022. We expect even more enrollments by Fall 2022.
3. During Fall 2021, we will have 5 students participate in their oral comprehensive exams. During Spring 2022, we will have 2 students participate. This is the largest number we've ever needed to facilitate in a single year.
    - We had 4 students participate and pass their oral comprehensive exams in Fall 2021 and two in Spring 2022. One also passed 3/4 subjects in Spring 2022 and will retest in Summer 2022.
4. During 2021-2022 we anticipate 7 students completing research projects (1 in Fall 2021, 1 in Spring 22 and 5 in Summer 2022). This is the most we've ever had before in a single year.
    - We had 1 student in Fall 2021, 1 student in Spring 2022 and we will have 4 students in Summer 2022 complete their capstone research projects this year. One student decided to go a little slower than planned and will complete their project this next year.
5. During the 2021-22 year, I will ask the Math/Stats department policy committee to continue work on a COSET aligned policy.
    - This did not happen this last year due to a very busy hiring season. However, in conjunction with the other grad advisors in the math and stats department, we will have a graduate handbook with policies on admission, graduate assistantships, comprehensive exams, and probation/expulsion by Summer 2022.
6. During the 2021-22 year, we will next submit Form B's for Special Topics Courses (MATH 5360) Concepts in Linear Algebra and Introduction to Analytical Statistical Techniques for Educational Research as we continue to round out the elective courses for the 100% online MA program.
    - We submitted Form B's for all three courses (a little ahead of schedule). Two courses were approved in this cycle and one will need a few more revisions but will be resubmitted by the original goal of the end of Summer 2022.

New Plan for Continuous Improvement Item

Closing Summary:

Building on the success of the 2021-22 year, we plan to work on improving during 2022-23 in the following ways:

1. To move forward in our Alumni Formal Assessments of MA Program, the next step to be taken will be to continue to collect personal email addresses of our graduates as part of a distribution list of MA Alumni in order to send out a survey to assess the effectiveness of the MA program at a future date.
2. To further market the 100% online MA program, we will request $2000 from the department to fund a continued marketing campaign going into Fall 2022 and Spring 2023. We will tweak what we learned from the last marketing campaign. If the department would support this, we would then request $2000-$3000 each from COSET and the School of Graduate Studies. The goal is to have an eventual enrollment of at least 30 students with a possibility of up to 45.
3. During Fall 2022, we will have 1 students participate in their oral comprehensive exams. During Spring 2023, we will have 3 students participate. During Summer 2023, we will have 2 students participate.
4. During 2022-2023 we anticipate 7 students completing research projects (1 in Fall 2022, 4 in Spring 2023 and 2 in Summer 2023).
5. During the 2022-23 year, I will ask the Math/Stats department policy committee to continue work on a COSET aligned policy for grad coordinator evaluation.
6. During the 2022-23 year, we will submit a revised Form B for Special Topics Course (MATH 5360) Quantitative Research in Education (this title may be revised) as we continue to round out the elective courses for the 100% online MA program.
7. During the 2022-23 year we will revisit our procedures for oral comprehensive exams. In the 2023-2024 academic year, we anticipate conducting 10 exams (8 of these during Spring 2024). This is quite large and very demanding on faculty's time. We will discuss if we should move to a hybrid written/oral exam as the program grows. We will also revisit the rubric for the exam.

Statistics MS

Consistent Cohort Of Graduate Students Each Year

Goal Description:

A cohort of ten supported graduate students to admit each year. This allows us to maintain a healthy program with consistent class sizes and class schedules.

Providing Department: Statistics MS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Support Ten New Students Each Year

Learning Objective Description:

We will support ten new graduate students each year, as many as twenty in the two years of our program. Support should be such that the full-time students are supported by at least $10,000 more than the cost of tuition and fees.

RELATED ITEM LEVEL 2

Foster a thriving MS program

Indicator Description:

In order to foster a thriving MS program in statistics, we need a total of 20 students, ideally 10 students per cohort. Any less than this, and our classes fail to run regularly. Any more than this, and the research needs of the students in such a large program exceed the faculty support available.

Criterion Description:

We will recruit enough students to be able to accept a cohort of 10 qualified incoming MS students each fall semester.

Findings Description:

We were not be able to achieve this goal. We have recruited six students in the fall 2021 and one in the spring 2022. Even though we had more qualified applicants, mainly due to the low stipend, they have decided to attend other programs(schools).

RELATED ITEM LEVEL 3

Foster a thriving MS Program

Action Description:

We failed to meet the goal to have a cohort of 10 students for each year. We will request the university/college to provide more TA positions and to increase the stipend. As a requirement by the university, we did a program evaluation by an outside independent reviewer couple of years ago. The reviewer suggested increasing the stipend with supplemental funding for summer along with tuition scholarships to cover in-state tuition. According to the review, unless SHSU makes this a top priority, no matter how well-oiled the recruiting plan and academic program are, there is no hope of getting quality students into the program. While there is a high number of applicants to the program at this stage, consistent underfunding and not being able to accommodate a higher number of students can result in an inability to produce the quality and quantity that is demanded from industry and academia. This will eventually result in a decline in application numbers and enrollments. A reversal can be difficult and costly. With the increase in freshman and developmental level courses, the department is relying on graduate students as teachers of record.

For our MS program to thrive, we believe that we have to consider implementing the reviewer's suggestions. Also, it would be helpful to bring more good quality international students if our Office of International Program adheres more friendly and accommodative policy.

We will request more funding for TAs to meet university seat capacity needs. Also, we will continue to work with the university administration to find a solution for this. At the same time, our faculty will increase their effort to recruit more qualified students.

Deliver A Curriculum That Emphasizes Communication Skills

Goal Description:

The curriculum will provide students with opportunities to develop the appropriate speaking, analyzing, and writing skills to function as a professional in the subject area. Our sequence of courses for four semester train the students in these skills. Students gain these experiences through different class projects which includes the oral presentation and written report. Students gain these experiences as a part of the Practicum requirement as well.

Providing Department: Statistics MS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Communicating Mathematical Ideas - Oral

Learning Objective Description:

Students will be able to prepare and deliver oral presentations of mathematical material through statistics practicum. Students will develop the ability to critique real world problems, and provide their own solutions based on statistical analysis.

RELATED ITEM LEVEL 2

Statistics Practicum

Indicator Description:

A statistics practicum(Registered under STAT 6380) should be completed by the students under the guidance of one of the faculty members (practicum supervisor). A letter grade is assigned for the practicum by the supervising faculty based on performance throughout the research project.

Criterion Description:

All candidates will receive a letter grade by his/her supervising faculty.

Findings Description:

All the students who have registered in the practicum course were able to successfully finish the practicum. Students were not able to present their work at the COTS(Conference of Texas Statisticians) due to the conference cancellation.

RELATED ITEM LEVEL 3

Statistics Practicum

Action Description:

The faculties will work with students to produce good quality practicums and provide them the opportunity to present their research at regional or national conferences.

Deliver A Curriculum With Appropriate Discipline Specific Skill Sets

Goal Description:

The curriculum will provide students with opportunities to develop professional skills typically required in the area of study. Our course sequence and practicum provide students data analysis, presentation, and report writing skills using different statistical softwares.

Providing Department: Statistics MS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Foundation Areas In Probability And Statistics

Learning Objective Description:

Students will have a working knowledge of the foundational topics including regression analysis, design of experiments, multivariate analysis, and mathematical statistics (Bayesian analysis, bio-statistics, quality control, non-parametric statistics, sampling theory, Time Series Analysis, and statistical computing,).

RELATED ITEM LEVEL 2

Comprehensive Oral Examination

Indicator Description:

A comprehensive oral examination, given by a committee of three faculty members, will be administered to candidates for the degree of M.S. in Statistics which will examine the candidate's knowledge of the primary areas of concentration within the program, as well as the candidates own communication abilities. The committee will then judge the candidates' knowledge on the materials according to a previously agreed upon rubric with three levels of comparison: High Pass, Pass, and Fail.

Criterion Description:

All candidates will receive a mark of either "High Pass" or "Pass" for the components of the comprehensive oral exam. The rubric used is the same one shown in the "Mathematical Statistics" criterion.

Findings Description:

Total of six graduate students appeared for the comprehensive oral exam in 2021. Two students received high pass on all subjects, four students received pass.

RELATED ITEM LEVEL 3

Comprehensive Oral Examination

Action Description:

Two students took the oral comprehensive exam in the last week of November 2021 and Four students took it during the last week of April 2022. All of them successfully finished the exam and graduated in May 2022. Students were ranked using high pass, pass, and fail. All of them got either high pass or pass.

Improve Instruction By TAs

Goal Description:

We will improve our instructional support for TA instruction in our elementary level Statistics courses. The designated faculty (course-coordinator) trains them for teaching before the semester starts. We will also encourage our assistants to attend the training conducted by GUIA (The Graduate/Undergraduate Instructor Academy.

Providing Department: Statistics MS

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Encourage And Train Teaching Assistants For Teaching

Learning Objective Description:

Will encourage and assign teaching assistants in elementary statistics courses as instructors. The designated faculty (course-coordinator) will train them for teaching. We will also encourage our assistants to attend the training conducted by GUIA (The Graduate/Undergraduate Instructor Academy.

RELATED ITEM LEVEL 2

Evaluation TA

Indicator Description:

Teaching evaluations and classroom visits by faculty. These visits will be managed/scheduled by the graduate advisor and/or course coordinators.

Criterion Description:
As many of our teaching assistants are not native speakers, a language barrier may be an additional challenge in their classroom.

Findings Description:
A faculty mentor was assigned to all TA serving as instructor of record. The faculty trained them to teach the classes. All the teaching assistants performed their job very well. We found that TA's value the assistance provided by the faculty mentor.

RELATED ITEM LEVEL 3

Evaluation TA

Action Description:
We will continue to closely monitor the performance of teaching and graduate assistants. This is will be done by course coordinators and graduate advisor. Inputs from their supervisors and faculty members will also be used to evaluate their performances. We are also planning to do the classroom observations for our teaching assistants.

Update to Previous Cycle's Plan for Continuous Improvement Item

Previous Cycle's Plan For Continuous Improvement (Do Not Modify):
We will make an effort to increase our funded student cohort size to 10 which will make our total number of funded positions for the program to be 20 students.
A good number of excellent graduate students initially apply to our program, but many eventually decline after getting higher TA financial offers from more competitive universities. This type of erosion obviously becomes a pronounced problem for any program. We have identified this as a serious issue for our program. We will continue to request the university to provide additional funding to overcome this problem.
We will provide students with more professional development opportunities and organize student group sessions where the students can make presentations in a friendly environment. This will be a great opportunity to learn how to present their research projects. We have been applying this for some time and observed that our students benefited from it significantly. We will continue to do this in the coming academic year as well.
We continue to assign second-year students to teach introductory statistics courses as instructors of record. We will continue to encourage our students to go through the PACE program graduate teaching perforation training certification. We also encourage our students to go through other professional development programs (Many are available online now).

Update of Progress to the Previous Cycle's PCI:
We were not able to achieve our goals as we planned. Our plan to produce more researchers, leaders, teachers, and experts in the field of statistics to fulfill the current demand did not meet as we expected. Not only this, we need more assistants to help our undergraduate classes. But with limited funding, we could not hire as many assistants as we thought. Also, the stipend we give them is not enough to cover their basic expenses including tuition fees. This is restricting us to recruit the good students.

We will continue with the same plan for the upcoming year. We believe this would be a good opportunity to raise the issues mentioned to help improving our program. Low stipend is the main issue we we would like to bring in attention to the University.

We will continue to provide professional development opportunities and prepare our students to be fulfill the current demand in solving the real world problems. We can assign all of our second year student to teach our introductory statistics classes if we become competitive in hiring and able to offer Assistantship to more qualified applicants.

New Plan for Continuous Improvement Item

Closing Summary:
We will make an effort to increase our funded student cohort size to 10 which will make our total number of funded positions for the program to be 20 students. We can serve our undergraduate students better if we have 20 funded students in our program. We have around 23 sections of STAT/MATH 3379 and 19 sections of MATH 1342 each semester. We use our second-year teaching assistants to teach MATH 1342 and graduate assistants to help with SPSS (statistical programing) and tutoring. Having more graduate assistants will make a significant impact on the success of our undergraduate students.
A good number of excellent graduate students initially apply to our Statistics program, but many eventually decline after getting higher TA financial offers from more competitive Universities. Over time, this type of erosion obviously becomes a pronounced problem for any program. We have identified this as a serious issue for our program. We will continue to request the university to provide additional funding to overcome this problem. The current funding we provide them is not sufficient to pay the tuition fee and other expenses. This is encouraging them to join or transfer to other universities.

We will provide students with more professional development opportunities. Will continuously organize student weekly group sessions where the students can make presentations in a friendly environment. This is a great opportunity for them to learn how to present their research projects. We observed that our students benefited from it significantly so will continue to do this in the coming academic year as well.

We will continue to assign our second-year students to teach introductory statistics courses as instructors of record. We will continue to encourage our students to go through the PACE program graduate teaching perforation training certification. We also encourage our students to go through other professional development programs (Many are available online now).

Department of Physics and Astronomy

2021-2022

Physics BS

Elevate the Reputation and Visibility of SHSU

Goal Description:

The Department seeks to elevate the reputation and visibility of SHSU by developing marketable skills that equip students for success in industry and the academy.

Providing Department: Physics BS

Progress: Ongoing

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Develop Core Mathematical Competencies in Applied Contexts

Learning Objective Description:

Lower division students will develop an interlinked network of quantitative skills in the context of physics and engineering applications. Skills to be addressed include algebra, trigonometry, vectors, logarithms and exponentials, polar coordinates, sinusoidal functions, complex numbers, matrices, differentiation, and integration.

RELATED ITEM LEVEL 2

First Year Physics Pre-Post Test

Indicator Description:

Students will complete a pre/post test in Physics 1411 assessing the common foundational concepts in Physics. Statistics will be collected on major, level of math coursework completed, and whether the Physics Bootcamp was completed.

Attached Files

1411_Pretest.pdf

Criterion Description:

Students will show significant improvement between pre and post test, relative to the standard deviation of scores. A quarter point will be deducted per incorrect response (out of five multiple choice selections) so that the expected score for guessing is a zero.

Findings Description:

In the most recent pre/post assessment pre-test scores were well within one standard deviation from zero. Post-test scores were above zero by 3.5 standard deviations, showing significant improvement.

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 2

Incoming Student Mathematics Pre-Post Test

Indicator Description:

Students in the Physics Bootcamp will be given a pre/post test to assess mathematics readiness and progress made during the course. Two example exams are given, one focused on SAT level mathematics and the other on Caculus.

Attached Files

Math_Pretest.pdf

Calculus_Pretest.pdf

Criterion Description:

Students will show significant improvement between pre and post test, relative to the standard deviation of scores. A quarter point will be deducted per incorrect response (out of five multiple choice selections) so that the expected score for guessing is a zero.

Findings Description:

Results were not collected during this cycle but will be collected next cycle.

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 1

Develop Experience in the Practice of Investigative Research

Learning Objective Description:

Upper division students will develop experience with research under the direct supervision of a faculty member.

RELATED ITEM LEVEL 2

Student Exposure to Research

Indicator Description:

The first indicator is inclusion of all Physics Majors and optionally also Astronomy Minors in a supervised research program. The second indicator is full participation in mentoring by the faculty.

Criterion Description:

Full participation by faculty and majors is expected.

Findings Description:

All faculty are supervising student research. All graduating Physics Majors are participating in a research project, and many are funded by the National Science Foundation.

RELATED ITEM LEVEL 1

Develop Higher-Order Critical Thinking Skills

Learning Objective Description:

Students at all levels will develop and demonstrate higher-order critical thinking skills, including a capacity to skillfully and creatively generalize techniques and principles to new contexts.

RELATED ITEM LEVEL 2

First Year Physics Pre-Post Test

Indicator Description:

Students will complete a pre/post test in Physics 1411 assessing the common foundational concepts in Physics. Statistics will be collected on major, level of math coursework completed, and whether the Physics Bootcamp was completed.

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Findings Description:

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RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

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Findings Description:

Results were not collected during this cycle but will be collected next cycle.

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 2

Introductory Astronomy Pre-Post Test

Indicator Description:

A pre-post test will be administered in the introductory Astronomy courses to assess progress on relevant objectives.

Criterion Description:

Pre and post-test scores will be computed and tested for significant improvement against a p-value of 0.05 .

Findings Description:

Statistically significant improvement was indicated in the most recent examinations, as detailed in the attached spreadsheet.

Attached Files

Scott_S-G.xlsx

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 2

Upper Division Physics Pre-Post Test

Indicator Description:

Students in selected upper division courses will complete a pre/post test based on the Graduate Record Subject Exam in Physics. Examples are attached for PHYS 4370 (Classical Mechanics) and PHYS 4366 (Quantum Mechanics).

Attached Files

Quantum_Mechanics_A.pdf

Classical_Mechanics_A.pdf

Criterion Description:

Students will show significant improvement between pre and post test, relative to the standard deviation of scores. A quarter point will be deducted per incorrect response (out of five multiple choice selections) so that the expected score for guessing is a zero.

Findings Description:

In the most recent pre/post assessment pre-test scores were within one standard deviation from zero. Post-test scores were above zero by 1.8 standard deviations, showing significant improvement.

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 1

Develop Marketable High-Demand Technical Skills

Learning Objective Description:

Students at all levels will develop and demonstrate skills valued in the workplace, such as mathematical sophistication, mental flexibility, trained intuition, capacity for abstraction, ability to independently and creatively solve problems, and experience working effectively on a team.

RELATED ITEM LEVEL 2

Development of Marketable Skills

Indicator Description:

Students will develop and demonstrate skills valued in the workplace, such as mathematical sophistication, mental flexibility, trained intuition, capacity for abstraction, ability to independently and creatively solve problems, and experience working effectively on a team.

Criterion Description:

A degree in physics opens a tremendous number of profitable career options because it develops marketable attributes and skills that employers are greatly interested in, such as mental flexibility, capacity for critical thinking, abstraction and generalization, training in creative problem solving, intuition for mechanical and electrical systems, and proficiency in advanced mathematics, data analysis, and computer applications (including programming).

These skills are developed throughout the degree program, starting with the Physics Bootcamp, which specifically addresses a majority of these marketable qualifications. Mathematical sophistication is developed through pedagogical exposure to the topics describe elsewhere, with extensive opportunities (recitation and homework) for self and team-based practice. Mental flexibility is encouraged by revisiting topics from multiple perspectives, by opportunities for peer-mentoring (where students may share distinct approaches), and by expressly furthering a recognition that any given problem can potentially be solved in a large variety of correct ways. Physical and mathematical intuition represents a bank of experience, refined by persistently comparing outcomes to expectations; thus, it may be usably projected onto new circumstances which resonate with those previously encountered. It is developed here by examples selected to build sensitivity to recurring patterns of thought, approaches to problem solving, and properties of natural law in the student's mind. Many such examples are selected expressly for their naively counter-intiuitive character. Abstraction is developed via extensive symbolic manipulation, and elevation of maximally general laws and principles. Independent creative problem solving is developed through a carefully structured sequence of examples and challenges that incrementally build on recently acquired skills, requiring students to visualize and implement compound (multi-step) procedures in order to predict an outcome or design an optimized treatment. Teamwork is developed in collaborative small-group practice sessions.

Mathematical sophistication and capacity to independently solve problems is very directly assessed by performance in exams, assignments, and weekly group problem-solving recitations. Mental flexibility, intuition, and capacity for abstraction likewise indirectly manifest themselves on assignments and tests, especially components of those exercises specifically designed to challenge students in the application of skills and techniques to novel contexts. They are also be assessed by dialog with students during instructional periods, including student polling, with opportunities to reflect and redirect based on feedback from the instructor and/or peers. Team performance is self and group assessed during the recitations. It is also monitored by faculty and/or teaching assistants walking the tables to answer questions from each student group. In addition to the career insight fostered by direct exposure to the tools and techniques of physics and engineering, the Bootcamp seeks to expose students to more advanced aspects of life as a physicist or engineer. One form for this interaction is research or professional presentations by invited departmental guests (or similar online events), where students may be required to submit a summary of the talk and their impressions. In the case of on-campus events, students also have the opportunity to ask the guest directly about their work and seek advice on pathways into similar career opportunities.

Findings Description:

Continuing.

RELATED ITEM LEVEL 3

Complete Redesign of the Conceptual Physics Course

Action Description:

The conceptual physics course (PHYS 1305) has historically been too similar to the course for science majors. Professor Shepherd has been redesigning the course with a focus on active learning and hands-on experiences that are transferrable to classrooms of the future educators who make up a large fraction of the course enrollment. Future related performance indicators are completion of the redesign, success with enrollment, and student self-assessment of applicability of the course content to their future use.

RELATED ITEM LEVEL 1

Develop Mastery Of Fundamental Principles In Physics

Learning Objective Description:

Students at all levels will be exposed to the fundamental laws of nature and understand how a small set of principles govern and relate an incredible variety of phenomena in real-world contexts.

RELATED ITEM LEVEL 2

First Year Physics Pre-Post Test

Indicator Description:

Students will complete a pre/post test in Physics 1411 assessing the common foundational concepts in Physics. Statistics will be collected on major, level of math coursework completed, and whether the Physics Bootcamp was completed.

Attached Files

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Criterion Description:

Students will show significant improvement between pre and post test, relative to the standard deviation of scores. A quarter point will be deducted per incorrect response (out of five multiple choice selections) so that the expected score for guessing is a zero.

Findings Description:

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RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 2

Upper Division Physics Pre-Post Test

Indicator Description:

Students in selected upper division courses will complete a pre/post test based on the Graduate Record Subject Exam in Physics. Examples are attached for PHYS 4370 (Classical Mechanics) and PHYS 4366 (Quantum Mechanics).

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Findings Description:

In the most recent pre/post assessment pre-test scores were within one standard deviation from zero. Post-test scores were above zero by 1.8 standard deviations, showing significant improvement.

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 1

Develop Skills in Applied and Creative Problem-Solving

Learning Objective Description:

Students at all levels will learn to combine physical reasoning with mathematical computation in order to creatively solve real world problems and make predictions for measurable outcomes.

RELATED ITEM LEVEL 2

First Year Physics Pre-Post Test

Indicator Description:

Students will complete a pre/post test in Physics 1411 assessing the common foundational concepts in Physics. Statistics will be collected on major, level of math coursework completed, and whether the Physics Bootcamp was completed.

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Criterion Description:

Students will show significant improvement between pre and post test, relative to the standard deviation of scores. A quarter point will be deducted per incorrect response (out of five multiple choice selections) so that the expected score for guessing is a zero.

Findings Description:

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RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

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Upper Division Physics Pre-Post Test

Indicator Description:

Students in selected upper division courses will complete a pre/post test based on the Graduate Record Subject Exam in Physics. Examples are attached for PHYS 4370 (Classical Mechanics) and PHYS 4366 (Quantum Mechanics).

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Findings Description:

In the most recent pre/post assessment pre-test scores were within one standard deviation from zero. Post-test scores were above zero by 1.8 standard deviations, showing significant improvement.

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

Expand Our Service to the State and Beyond

Goal Description:

The Department seeks to expand its service to the state and beyond by promoting science appreciation in the general population and offering innovative credentialing tracks supporting high-value careers.

Providing Department: Physics BS

Progress: Ongoing

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Expand and Promote Appreciation for the Methods and Progress of Science

Learning Objective Description:

Students in core science and introductory courses will be instructed in the methods and successes of scientific approaches to understanding the world.

RELATED ITEM LEVEL 2

Introductory Astronomy Pre-Post Test

Indicator Description:

A pre-post test will be administered in the introductory Astronomy courses to assess progress on relevant objectives.

Criterion Description:

Pre and post-test scores will be computed and tested for significant improvement against a p-value of 0.05 .

Findings Description:

Statistically significant improvement was indicated in the most recent examinations, as detailed in the attached spreadsheet.

Attached Files

Scott_S-G.xlsx

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 1

Expand and Promote Appreciation for the Wonder of the Natural World

Learning Objective Description:

Students in introductory and core science courses will be exposed to the magnificence and order of the natural world.

RELATED ITEM LEVEL 2

Introductory Astronomy Pre-Post Test

Indicator Description:

A pre-post test will be administered in the introductory Astronomy courses to assess progress on relevant objectives.

Criterion Description:

Pre and post-test scores will be computed and tested for significant improvement against a p-value of 0.05 .

Findings Description:

Statistically significant improvement was indicated in the most recent examinations, as detailed in the attached spreadsheet.

Attached Files

Scott_S-G.xlsx

RELATED ITEM LEVEL 3

Continue Improving Assessment Materials

Action Description:

Continue refinement of pre-post exam materials and expand testing.

RELATED ITEM LEVEL 1

Expand and Promote Credentialed Tracks in Astronomy

Performance Objective Description:

The Department seeks to expand student pathways in Astronomy with a new Astronomy Minor, supporting graduate study and careers in sectors such as space science and education.

RELATED ITEM LEVEL 2

Introduce Astronomy Minor

KPI Description:

The first relevant indicator is completion of the approval process to offer an Astronomy Minor. Subsequently, the program may be assessed for rate of enrollment, rate of completion, and student outcomes including progress toward graduate study or employment in an associated career.

Results Description:

Pending.

RELATED ITEM LEVEL 1

Expand and Promote Credentialed Tracks in Engineering and Applied Physics

Performance Objective Description:

The Department seeks growth in the Pre-Engineering 2+2 tracks, as well as the dual degree Physics / Pre-Engineering track, and provide opportunities for students in applied physics. The performance objectives are increased enrollment and successful graduations / transfers.

RELATED ITEM LEVEL 2

Promote Tracks in Pre-Engineering

KPI Description:

The performance indicator will be growth in the number of students declaring a Pre-Engineering Major (or participating in the dual degree program) and transitioning successfully to an accredited Engineering school. Graduates may be tracked after graduation to self-assess the quality of their preparation and to gather statistics on secondary outcomes.

Results Description:

Pending

RELATED ITEM LEVEL 1

Expand and Promote Credentialed Tracks in Physics and Astronomy Education

Performance Objective Description:

The Department seeks to partner with the College of Education to promote careers in science education and to equip students pursuing those careers with a suitable combination of core science competencies and pedagogical methods. The performance objectives are increased graduation rates, job placement, and career longevity.

RELATED ITEM LEVEL 2

Promote Tracks in STEM Education

KPI Description:

The performance indicator will be growth in the number of students enrolled in STEM education tracks with a (second) Major in Physics or a Minor in Astronomy. Graduates may be tracked after graduation to self-assess the quality of their preparation and to gather statistics on career longevity.

Results Description:

Pending.

RELATED ITEM LEVEL 3

Complete Redesign of the Conceptual Physics Course

Action Description:

The conceptual physics course (PHYS 1305) has historically been too similar to the course for science majors. Professor Shepherd has been redesigning the course with a focus on active learning and hands-on experiences that are transferrable to classrooms of the future educators who make up a large fraction of the course enrollment. Future related performance indicators are completion of the redesign, success with enrollment, and student self-assessment of applicability of the course content to their future use.

RELATED ITEM LEVEL 1

Expand and Promote Tracks Leading to Graduate Study in Physics

Performance Objective Description:

The Department seeks to expand pathways for students interested in continuation to graduate programs in Physics and Astronomy. The performance objectives are increased applications, acceptances, and degree completions.

RELATED ITEM LEVEL 2

Promote Continuation to Graduate Study

KPI Description:

The performance indicator will be growth in the number of students with a Major in Physics or a Minor in Astronomy proceeding to PhD and Masters programs. Graduates may be tracked after graduation to self-assess the quality of their preparation and to gather statistics on secondary outcomes.

Results Description:

Pending

Prioritize Student Success and Student Access

Goal Description:

The Department seeks to prioritize student success and student access by providing accessible educational pathways matched to high-value careers and mitigating achievement gaps.

Providing Department: Physics BS

Progress: Ongoing

RELATED ITEMS/ELEMENTS

RELATED ITEM LEVEL 1

Provide Efficient Pathways for Students Who Arrive Near-to-Calculus-Ready

Performance Objective Description:

The Department seeks to efficiently transition students who arrive near calculus-ready into successful coenrollment in Physics I and Calculus I during their first semester at SHSU through a new summer bridge program. The performance objective is improvement in the pass rate coupled with acceleration of the degree plan.

RELATED ITEM LEVEL 2

Introduce Summer Bridge Program and Common First Year in STEM

KPI Description:

The first indicator will be initiation of the programs. Subsequently, the summer bridge will be assessed for enrollment, and progress of participants will be assessed using pre-post testing. Their subsequent outcomes in the first year STEM experience at SHSU may also be compared against a control group, correcting for other educational and preparatory differences.

Results Description:

Pending.

RELATED ITEM LEVEL 3

Complete First Offering of the Summer Bridge and Common First Year Experience

Action Description:

Planning is continuing for the first summer bridge for students who are near calculus-ready in 2023. This may subsequently form the foundation for the proposed common first year experience.

RELATED ITEM LEVEL 1

Provide Flexible Pathways for Students With Broad Interests in STEM

Performance Objective Description:

The Department seeks provide students with general interest in various STEM disciplines an opportunity to complete a common first year experience that samples various possibilities without sacrificing credit or degree progress.

RELATED ITEM LEVEL 2

Introduce Summer Bridge Program and Common First Year in STEM

KPI Description:

The first indicator will be initiation of the programs. Subsequently, the summer bridge will be assessed for enrollment, and progress of participants will be assessed using pre-post testing. Their subsequent outcomes in the first year STEM experience at SHSU may also be compared against a control group, correcting for other educational and preparatory differences.

Results Description:

Pending.

RELATED ITEM LEVEL 3

Complete First Offering of the Summer Bridge and Common First Year Experience

Action Description:

Planning is continuing for the first summer bridge for students who are near calculus-ready in 2023. This may subsequently form the foundation for the proposed common first year experience.

RELATED ITEM LEVEL 1

Provide Greater Accessibility and Reach for the Physics Bootcamp

Performance Objective Description:

The Department seeks to expand the reach and accessibility of the Physics Bootcamp through inclusion in the University Core Science curriculum.

RELATED ITEM LEVEL 2

Inclusion of Physics Bootcamp in the Core Curriculum

KPI Description:

The indicator of success will be inclusion of Physics Bootcamp in the Core Science Curriculum for 2023.

Results Description:

Pending.

Update to Previous Cycle's Plan for Continuous Improvement Item

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

Closing Summary

The department seeks to enhance the opportunity for incoming freshmen interested in physics and astronomy to explore the major at an early juncture without prerequisites and without penalties to financial aid eligibility, by adding Physics Bootcamp (PHYS 1401) to the core curriculum.

The department seeks to improve engagement with applied physics and pre-engineering students by assuming responsibility for the pre-engineering degree tracks in the Fall of 2022. Preparatory work will continue up to that point.

The department seeks to attract students interested in professional work in astronomy and astrophysics by opening a new minor in Astronomy.

Professor Shepherd (funded under the Engaging Classrooms / QEP) will lead redevelopment of the 1305/1105 curriculum. Updates will emphasize hands-on elements and aspects of physical science which are directly transferrable to students of elementary educators who graduate from Sam.

The department seeks to expand the number of students taking advantage of calculus-based introductory physics among majors from other departments which require calculus. This includes computer science and a subset of the engineering technology degrees.

The department seeks to improve outreach and advertisement, including by further improvements to the website, including video student testimonials.

Update of Progress to the Previous Cycle's PCI:

The submission of Bootcamp to the Core Curriculum was completed and approved at the College level. The proposal is pending at the University level, with the goal of approval for 2023.

Supervision of pre-engineering tracks will begin in Fall 2022, on schedule.

The new Astronomy minor has been approved.

The course redesign for Conceptual Physics was tested with a first set of students and is proceeding on schedule.

Additional student video testimonials were recorded, with publication pending.

New Plan for Continuous Improvement

Closing Summary:

The Department seeks to grow enrollment in several targeted academic tracks, including STEM Education, Pre-Engineering, and Astronomy, while also increasing the number of Physics majors progressing to graduate study.

The Department seeks to develop marketable technical skills, with a focus on the promotion of critical thinking, abstract reasoning, mathematical sophistication, physical intuition, creative problem solving, and teamwork.

The Department seeks to promote student success with expansion of the Physics Bootcamp, development of a summer bridge program for students who are near calculus-ready, and initiation of a common first year program for quantitative STEM tracks.

The Department seeks to promote appreciate for the progress of science and the majesty of the natural world.

The department seeks to improve outreach and advertisement, including by further improvements to the website, including video student testimonials.