Sam Houston State University

2014-2015

College of Sciences

Department of Agricultural Sciences and Engineering Technology

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Agricultural Engineering Technology BS

Goal **Knowledge Of Key Concepts And Skills**

Increase students' knowledge of key concepts and skills in agricultural engineering technology.

Objective (L) **Development Of Students' Knowledge And Skills**

During their enrollment in the program students will be required to complete assignments that require students to demonstrate competency in key STEM areas (physics, math, and technology) associated with Agricultural Engineering Technology (AET).

Indicator **Advanced AET Course Assignment Rubric**

All students enrolled in the AET program must complete a capstone course (AGRI 4381) course. The course addresses key concepts in AET and STEM skills (technology, math, and engineering - physics) relevant to agricultural engineering technology. Seven randomly selected student assignments and projects will be reviewed by faculty members with expertise in the field of agricultural engineering technology. 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 **At Least 70% Rated As Meeting Expectations**

At least 70% of the students enrolled in an advanced AET course will perform at an acceptable level with an assessed score of 3 (meets expectations) or higher.

Finding **AET Outcome Assessment**

Expectations were exceeded by the 20 reviewed AET student activities with the average being 100% rated as “meets expectations” or higher. Students averaged 3.9/5 overall, however, they scored 3.7 and 3.8 in knowledge and application of technical skill and performance of skill; respectively. These technical and application skills were the lowest of all other categories assess on the rubric.

Action **Modifications**

Student outcomes were the weakest in areas of technical skill, application of knowledge and performance of skills. The course is a very lab intensive structure, therefore, faculty will require more outside learning and reading with assignments and problem sets that will strengthen STEM area weaknesses and technical knowledge.

Goal **Develop Professional Skills**

Students earning a BS in Agricultural Engineering Technology will learn the skills necessary for seeking jobs placement and technical writing in the work place.

Objective (L) **Development Of Marketplace Skills**

Students completing the BS in Agricultural Engineering Technology will demonstrate soft skills necessary to compete in the professional marketplace. These skills include professional writing and communication.

Indicator **AGRI 4120 Assignment Rubric**

All students seeking a degree in Agricultural Engineering Technology will be required to complete AGRI 4120 during their senior year. The course addresses essential skills necessary for job placement in the workforce for agriculture employment - resume preparation, interview skills, technical writing skills and employment opportunities. Faculty will review student assignments and access student performance on selected assignments using a faculty-developed rubric.

Criterion **70% Of Students Rated As Meeting Expectations**

Faculty evaluations will indicate that at least 70% of the AET students enrolled in AGRI 4120 will perform at an acceptable level and score a 3 (meets expectations) or higher on a scale of 1-5. Technical writing skills with emphasis on cohesiveness and concise writing were concerns from previous evaluation and continues to be an area addressed.

Finding **Technical Writing Skills**

The goal for AET students was not achieved with an average score of 2.89 out of a possible 5.0 by assessing assignments from 5 of the 11 enrolled students. Technical writing skills and resumes were minimally acceptable yet organization of portfolio is a weakness needing improvement.

Action **Improvement In Technical Writing**

Focusing students on importance of key elements in resume writing and cover letter in class proved to be beneficial in improving scores for cohesiveness and concise writing; however, students fell short on other technical aspects.

Previous Cycle's "Plan for Continuous Improvement"

Professor will continue to emphasize the use of the writing center and AET faculty will continue to implement writing across the AET courses.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

Improvements were noted in writing, however, technical skills and writing are still a concern.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

Technical AET skills and their application are a major concern of faculty. Students will have more out of class assignments and readings to improve technical knowledge of AET and STEM core concepts.

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Agriculture BS

Goal

Knowledge Of Key Concepts And Skills

Students will develop knowledge and skills relevant to agriculture.

Objective (L)

Development Of Students' Knowledge And Skills

Students will be able to demonstrate competency in key areas of professional communication skills through electronic presentations of technical agriculture content. Content knowledge along with writing and oral communications will be important skills assessed.

Indicator

AGRI 3360 Assignment Rubric

All students enrolled in the program must complete AGRI 3360. AGRI 3360 addresses key presentation concepts via electronic media and communication and writing skills of technical content in agriculture. Five presentations of students majoring in Agriculture will be reviewed by faculty members with expertise in the field of agriculture. Faculty members will score the assignments using a scale that ranged from 1-10 for specific aspects of the presentation and oral skills with categories of no evidence of achievement, inadequate evidence, adequate, and outstanding (see attached rubric).

Criterion

At Least 70% Rated As Meeting Expectations

Faculty in the Agriculture Department will assess the knowledge of agriculture from students enrolled in AGR 3360 via oral and electronic presentation of technical topics relevant to agriculture. At least 70% of the students will be expected to perform at a level equivalent to adequate evidence or higher as noted on the rubric. Specific focus will be in the areas of clarity, ag/content knowledge and grammar will skills of emphasis as noted from previous review.

Finding

Student Success In Learning Outcomes

Expectations were exceeded by the 5 reviewed presentations with the average being 80% rated as adequate or higher. Students averaged 4.8/5 on grammar, 2.8/3 on clarity of content, and 6.2/7 on content and elaboration of agriculture knowledge.

Action

Technical Knowledge And Presentation Skills

Criterion assessed were met and exceeded expectations, even though, the area of professionalism of the oral presentation was acceptable it scored the lowest on the rubric with an average of 4/5. Focus will be directed to ensuring students understand appropriate voice quality, enthusiasm, mannerisms, and body movement while making oral presentations.

Goal

Develop Professional Skills In Agriculture

Students will learn the skills necessary for seeking job placement and technical writing in the agricuulture work place.

Objective (L)

Development Of Marketplace Skills

Students completing the BS in Agricultural Communications will demonstrate skills necessary to compete in the professional marketplace.

Indicator

AGRI 4120 Assignment Rubric

All students seeking a degree in Agriculture will be required to complete AGRI 4120 during their senior year. The course addresses essential skills necessary for job placement in the workforce for agriculture employment - resume preparation, interview skills, technical writing skills and employment opportunities. Faculty will review student assignments and access student performance on selected assignments using a faculty-developed rubric.

Criterion

70% Of Students To Meet Professional Expectations

Faculty evaluations will indicate that at least 70% of the Agriculture students enrolled in AGRI 4120 will perform at an acceptable level and score a 3 (meets expectations) or higher on a scale of 1-5. Technical writing skills and proper grammar were concerns from previous evaluation and continues to an area addressed.

Finding

Technical Writing Skills

The goal for Agriculture students was achieved with an average score 3.56 out of a possible 5.0 by assessing assignments from 5 of the 5 enrolled students. Technical writing skills and resumes were acceptable yet organization of portfolio is a weakness needing improvement.

Action

Profesional Portfolio Improvements

Focusing students on importance of key elements in resume writing and cover letter in class proved to be beneficial by meeting expectations. Therefore, this will be continued in the next period with continued emphasis on organization of materials.

Previous Cycle's "Plan for Continuous Improvement"

Plans from the previous assessment cycle will remain: organizational skills of presentations, grammar and concise writing will be critical objectives.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

No AGRI students were registered in the course for the previous assessment. This period 5 students were enrolled and all 5 were assessed. Combining grammar and technical writing in AGRI 3360 and 4120 have been beneficial in overall score improvements. These criterion of assessment will continue.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

Focus will be directed to ensuring students understand appropriate voice quality, enthusiasm, mannerisms, and body movement while making oral presentations.

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Animal Science BS

Goal

Knowledge Of Key Concepts And Skills

Students will develop knowledge and understanding of key concepts and skills relevant to Animal Science.

Objective (L)

Development Of Students' Knowledge And Skills

Students will be able to demonstrate competency in key areas of animal science with emphasis in nutrition and management.

Indicator

Advanced Animal Production Assignment Rubric

All students enrolled in the program must complete an advanced animal science course. The course for assessment (AGRI 3373) addresses key concepts relevant to nutrition and management relative to the field of animal science and knowledge expected for animal science graduates. During the fall semester, 15 randomly selected student assignments will be reviewed by animal science faculty members. 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

70% Meet Expectations

There will be a general consensus among Animal Science Faculty members that at least 70% of the students enrolled in the advanced course will perform at an acceptable level with a score of 3 (meets expectations) or higher, especially in the areas of scientific knowledge, application of knowledge, and technical writing skills. Weaknesses to be observed: scientific knowledge and application of knowledge. Although the goal was not achieved last year, the standard will remain at 3 (meets expectations) for this assessment period.

Finding

Technical Knowledge And Application

Only 53% of the evaluated questions scored a 3 or better on the rubric, the remaining scores below a 3 with 3 showing little to now knowledge of nutrition or its application. On average the score was 2.47. The low score was due to a large number of students that demonstrated a lack of knowledge of nutrition and application of the concepts. More detail and emphasis on nutrition and its application will be taught in class with supplemental videos provide via Bb. Quizzes will address more technical information to prepare the student.

Action

Plan Of Action

More detail and emphasis on nutrition and its application will be taught in class with supplemental videos provide via Bb. Quizzes will address more technical information to prepare the student.

Goal

Develop Professional Skills

Students will learn the skills necessary for seeking jobs placement and technical writing in the work place.

Objective (L)

Development Of Marketplace Skills

Students completing the BS in Animal Science will demonstrate skills necessary to compete in the professional marketplace.

Indicator

AGRI 4120 Assignment Rubric

All students seeking a degree in Animal Science will be required to complete AGRI 4120 during their senior year. The course addresses essential skills necessary to compete in the market place for agriculture employment - resume preparation, interview skills, and employment opportunities. Faculty will review student assignments and access student performance on selected assignments using a faculty-developed rubric.

Criterion

70% Of Students To Meet Expectations

Faculty evaluations are expected to indicate that at least 70% of the animal science students enrolled in AGRI 4120 will perform at an acceptable level and score a 3 (meets expectations) or higher on a scale of 1-5.

Finding

Technical Writing Skills

The goal for Animal Science students was achieved with an average score of 3.7 out of a possible 5.0 by assessing assignments from 15 of the 30 enrolled students. Technical writing skills and resumes were of good quality and well organized, however grammar was a concern when assess letters of intent and were minimally acceptable.

Action

Subsequent Action

Properly written letters and examples will be provide in student packets to assist in expectations and layout.

Previous Cycle's "Plan for Continuous Improvement"

Emphasis will continue on professional writing and concise writing skills. Lecture outlines and lecture modifications will be incorporated in the classroom to improve student scientific knowledge and application of such knowledge.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

Continuing with the plan.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

Lecture outlines and supplemental materials will be provide in courses to assist in students gaining knowledge and understanding key concepts.

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Engineering Technology BS

Goal **Develop Knowledge And Safety Skills**

Students will develop knowledge and safety skills relevant to EngineeringTechnology.

Objective (L) **Development Of Students' Knowledge And Skills**

Students will be able to demonstrate competency in key areas of engineering technology by passing the OSHA Safety Course and receive OSHA Certification. The OSHA Certification serves as a capstone requirement. The test is administered by an outside agency.

Indicator **ITEC 4382 OSHA Certification**

All students enrolled in the program must complete ITEC 4382 and receive their OSHA Certification in Safety. The course addresses key concepts and skills relevant to safety in the field of Industrial Technology. Each semester all students are required to take the OSHA Certification examination as the capstone activity for the course. The cortication exam is divided into multiple sections, however, an overall passing grade of 70% or higher is passing.

Criterion **100% Certification Rate**

There is a consensus that at least 80% of the students taking the OSHA examination will make a 90 or higher on the exam, while, 100% will be certified by making a score of 70 or higher. A score of 90 or higher indicates comprehension of key concepts and elements of safety management and managing risk.

Finding **Completion**

All 27 students completed the examination and scored 70% or higher, thus, receiving certification. However, only 7% of the students scored 90 or higher.

Action **Learning Modificaiton**

Students will be given more examples of fall hazards and receive additional similations of assist in risk management.

Goal **Develop Professional Skills**

Students will learn the skills necessary to compete in the professional marketplace.

Objective (L) **Demonstrate Professional Skills**

Students completing the BS in Engineering Technology will gain experiental learning and field experience in the industry through an internship necessary to successfully gain employment.

Indicator **ITEC 4391 Internship Evaluation**

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

Criterion **85% Meeting Expectations**

There will be a general consensus among ETEC Faculty members that at least 85% of the students enrolled in ITEC 4391 demonstrate an above average (4.0 or higher) level of performance on the rating scales.

Finding **Outcome Assessment**

All students successfully completed their internship with assessed skill levels from the supervisor of 4 or 5. According to the supervisor, the interns were professional with exceptional work ethics and skill sets. Skill levels met or exceeded the expectations of the job requirement. Surveying skills was an area that few supervisors would like to see included in the curriculum.

Action **Student Performance**

Survey course will be included in curriculum if faculty is identified to teach concepts.

Previous Cycle's "Plan for Continuous Improvement"

More time and simulations will be used to increase student performance in Health and Fall Hazards in construction areas.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

Simulations were for fall hazards improved scores, however more will assist with risk management.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

Survey course is to be included in 2015-2016 curriculum if new ETEC faculty is hired.

Department of Biological Sciences

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Biology BA / BS

Goal **Effectively Deliver A Core Curriculum**

Students will be presented well designed classes to facilitate mastering of the materials identified as a core foundation in biology – Botany, Zoology and Cell Biology

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Objective (L) **Mastery Of Core Curriculum**

Students will demonstrate a mastery of the core fields in biology: Botany, Zoology, Cell Biology, Microbiology, Genetics, Ecology and Evolution.

Indicator **Assessment Exam For Core Classes**

All graduating seniors will take an exiting Biology Assessment Exam (BAE), written by the Biology Faculty. We will analyze the BAE scores from the following areas: botany, zoology, cell biology, microbiology, genetics, evolution & ecology to evaluate whether students have a significant level of understanding of each of these fields.

Criterion **BAE Analysis For Core Classes**

All Biology majors will be expected to score significantly better than a failing grade in all core areas: botany, zoology, cell biology, microbiology, genetics, evolution and ecology.

Finding **BAE Analysis For Core Classes**

Fifty (45%) graduating seniors took the Biology Assesment Exam. On average, students scored significantly greater than a failing grade (based a chi-square test against randomized answer choices) in all core areas. (Fig. 1). In general, questions with a high level of difficulty usually had a high frequency of incorrect answers. Questions of intermediate or low difficulty had a range of few wrong answer choices or a high number of incorrect answer choices (Fig. 2).

Action **Administer Exit Exam**

All Graduating seniors will be contacted by email and asked to take a biology exit exam that will test their comprehension of material from the basic core classes in biological sciences

Objective (L) **Understanding The Scientific Method And Develop Critical Thinking**

Students will demonstrate an understanding of the general nature of scientific knowledge and how scientific knowledge is gained (the scientific method). They also will be able to critically evaluate scientific data to draw informed conclusions.

Indicator **BAE Analysis**

All graduating seniors will take the Biology Assessment Exam (BAE). We will use BAE exam scores from analytical

questions to evaluate a student's understanding of the scientific method and critical thinking.

Criterion

BAE Analysis

All Biology majors will be expected to score significantly better than failing on analytical questions related to the scientific method and critical thinking.

Finding

BAE Results For Scientific Method And Critical Thinking

We examined the number of questions missed for questions that required critical thinking and graphical interpretation. Both are seated within principles of the scientific method. We found a difference between questiosn requiring graphical interpretation; and questions not requiring interpretation of graphical data. Specifically, students missed more questions that required interpretation of graphs. We found no difference between questions requiring analytical calculation and those not requiring calculations. See Fig. 3 for Specifics.

Action

Administer Exit Exam

All Graduating seniors will be contacted by email and asked to take a biology exit exam that will test their ability to use the scientific method and think critically.

Previous Cycle's "Plan for Continuous Improvement"

The Department of Biological Sciences now has 2 years of assessment exam data. Based on this we will begin comparing the two years. We also will continue to review quesions in core areas, expand upon the critical thinking component to the exam, and continue to promote the test to maximize turnout.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.
Based on 3 years of assessment data, students tend to score similarly year after year. Therefore, we will discuss these results in the department to evaluate whether core objective are being taught in all core classes. We will investigate ways to increase retention of core material and promote critical thinking.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.
The departmental will continue to evaluate:

1. expectations in each core area
2. review questions within each core area
3. balance the number of factual knowledge questions and critical thinking questions.
4. create a broader range of question difficulties that will aid in analysis
5. plan a mechanism to increase test turnout

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Biology MS

Goal **Increase Knowledge Of Profession**

Students will gain knowledge of the profession by gaining experience in presenting at scientific conferences and through publication.

Objective (L) **Students Knowledge Of Publication Process**

Students will be evaluated on their knowledge about the publication process.
A test that examines the students knowledge of the profession will be admistered when the student enters graduate school. After they take a course on professional aspects of biology, they will retake the exam. Student progress will be evaluated to examin knowledge of the publication process, etc.

Indicator **Exit Exam**

Students will take an exit exam that asks specific questions about the publication process.

Criterion **Exit Exam - Publications**

Scores will be compared to entrance exam. An increase in knowledge about the publication process will be an indicator of success.

Finding **Exit Exam**

We did not implement the exit exam during this review period. We conducted an external review of the program and based on this review we are evaluating the program goals and objectives and how we will assess program success.

Indicator **Publication Rate**

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

Criterion **Publication Rate**

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.

Finding **Publications**

4 MS students graduated during this cycle. 1 new publication was produced by these students during their time in the biology department.

Action **Increase Publication Rates**

on average students published 0.5 papers in the previous review cycle. in this review cycle the rate was 0.25 papers per student. The faculty will work to identify ways to increase this rate.

Previous Cycle's "Plan for Continuous Improvement"

We will continue collecting data for graduate publication rates over time. We may reassess the importance (significance) of the publication rate variable for monitoring MS program success. Currently this prameter seems to provide little information since so few students actually publish during their program.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

We continue to question the importance or value of this indicator. The publication rate of .25 this cycle was low and may be within the expectations of MS students. The department will evaluate this criterion and either discuss ways to improve or identify a different criterion for assessment.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

The biology department conducted an external review of the graduate program. The results of that review are being analyzed by the graduate committee in biology and addressing targeted areas of concern. This include: time to completion, funding, teaching load, course load, and course offerings.

Department of Chemistry

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Chemistry BS

Goal

Deliver A Curriculum Appropriate For Understanding Fundamentals Of Chemistry

The curriculum will address the discipline specific knowledge dictated by professional societies and/or professionals in the workforce.

Objective (L)

Demonstrate Understanding Of Fundamentals

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.

Indicator

American Chemical Society (ACS) General Chemistry Test

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.

Criterion

ACS General Chemistry Examination Score

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. The major weakness in 2010-2011 was the low number of majors who took the exam. We continue to work to motivate more students to take the exam.

Finding

ACS General Chemistry Result

Of the 18 students that took the exam (73 were invited to do so), 15 (83%) scored within one standard deviation of the mean or higher on the ACS standardized general chemistry examination. The criterion was met and exceeded overall. For chemistry majors (excluding forensic chemistry majors), 4 students took the exam (29 were invited to do) and all 4 of them (100%) scored within one standard deviation of the mean or higher. Thus the criterion was met for the chemistry majors. Overall, the participation rate for the academic year was 18/73 = 25% (and 4/29 = 14% for

chemistry majors and 14/54 = 26% for forensic chemistry majors). We need to keep working on ways to encourage and allow participation in this exam.

Action

Fundamental Knowledge

We think sitting for the ACS General Chemistry exam for chemistry and forensic chemistry majors as they finish CHEM 1412 (General Chemistry II) is important. We think that the scholarship money is a good incentive. This year's participation rate of 25% is down from last year and somewhat disappointing. Offering two opportunities to take the exam in the fall and spring did not lead to a higher participation rate this past year. Since we only sent one email announcement in the spring, we will send out two announcements to see if we can increase participation.

Goal

Deliver A Curriculum Appropriate For Understanding Organic Chemistry

The curriculum will provide students with opportunities to develop the skills typically required of professionals in the area organic chemistry.

Objective (L)

Demonstrate Understanding Of Organic Chemistry

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.

Indicator

ACS Organic Chemistry Test

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

ACS Organic Chemistry Examination Score

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.

Finding

ACS Organic Chemistry Result

Thirteen chemistry majors and 27 forensic chemistry majors took the new exam during the academic year. Ten of the chemistry majors (10/13 = 77%) and 15 of the forensic chemistry majors (15/27 = 56%) scored within one

standard deviation of the mean or higher on the ACS standardized organic chemistry examination. Overall, the rate was 25/40 = 56%. The criterion was not met overall for these students. However, it was met for the chemistry majors. Two years ago, one instructor was identified as being correlated with an increased number of low scores. That instructor again did not teach CHEM 2325 (Organic Chemistry II) this year. Once again, when multiple sections of a course are offered (as they were during the spring semester), the section that filled the fastest had the lowest performance on this exam. Those students who did not meet the criterion will repeat CHEM 2325. Also, a new version of the ACS test was used. In the fall semester, students were given both exams and they did slightly better on the new exam.

Action

Organic Chemistry

Once again (for the third year in a row), we have data for all of the sections of CHEM 2325 (organic chemistry II) that were taught, and the biggest correlation with low performance on the standardized exam is the section that fills most quickly when there are multiple sections. This suggests that some degree of student self-selection--perhaps they are choosing instructors that they perceive to be "easiest" or perhaps it is a time of day issue--is a factor. We will continue to monitor the situation. In the past year, all of the students who failed to meet the criterion repeated the course and subsequently met the criterion. We will continue to assess students' performance.

Goal

Deliver A Curriculum Appropriate For Mastery Of Advanced Chemistry Topics

The curriculum will provide students with opportunities to develop the skills typically required of professionals in the area of advanced chemistry topics.

Objective (L)

Demonstrate Mastery Of Advanced Topics In Chemistry

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.

Indicator

CHM 4448 Final Examination

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

75% Of Chemistry Majors Scoring At Least 60%

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.

Finding

Physical Chemistry Final Exam Results

Thirty-six of the 40 students enrolled in CHEM 4448 made at least 60% on the final, so 90% of the students scored >60% on the final exam. The criterion was met.

There were 4 students who scored below 60% on the final exam--two of these were repeating the course having scored below 60% on the final exam. As reported last year, students who had done poorly before had extremely poor time management skills. In an effort to address this, the Dr. Williams required 10 pages of homework to be uploaded each week. This forced the students to document that they were doing a substantial amount of work between lectures and exams. Those who did poorly had a substantial number of zeros on the homework upload requirement, which shows that they were not doing their part to learn the material.

Interestingly, this requirement to upload homework pages to Blackboard received favorable commentary on the class evaluation questionnaire. Here are some quotes from the students:

"This is a difficult class, but having weekly homework assignments helped keep up with the class content."
"I really like how this course was orchestrated. I liked that there were deadlines to meet & I do think there should be consequences to late submissions (lab work/homework) but I found them a bit harsh under certain circumstances."
"Turning in the homework via Blackboard was a good idea & a great way to keep me motivated to do the practice problems. I suggest continuing that."
"With the homework, sometimes it was overbearing because it was a lot to get done in a week. Maybe 10 questions a week but no more. With the other courses being taken, it was very difficult to stay on top of it."

Action

Physical Chemistry Action

Dr. Williams will continue to refine the homework assignments, and is pleased that the students are commenting on how they are being pushed to do more work on their own between the exams.

Goal

Deliver A Curriculum Appropriate For Understanding Instrumental Analytical Methods In Chemistry

The curriculum will provide students with opportunities to develop the skills typically required of professionals in the area of instrumental analytical methods in chemistry.

Objective (L)

Demonstrate Understanding Of Instrumental Analytical Methods In Chemistry

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. Dr. Thomas Chasteen has been the instructor for all sections of CHEM 4440 for more than a decade.

Indicator

Examinations In Instrumental Analytical Chemistry

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. Th%testing of this knowledge and its application is standardized within the department across all sections.

Criterion

80% Of Chemistry Majors Meeting Expectations

Eighty 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.

Finding

Performance On CHEM 4440 Exams

On the first exam, 31 of the 38 students (82%) scored within one standard deviation of the mean or higher. On the second exam, 31 of the 38 students (82%) scored within one standard deviation of the mean or higher. On the third exam, 33 of the 38 students (87%) scored within one standard deviation of the mean or higher. On the final exam, 34 of the 38 students (89%) scored within one standard deviation of the mean or higher. The criterion was met for each exam, and overall the criterion was met. Clearly intervention is not needed.

Action

Monitor Instrumental Analysis Performance

We will assess student performance in CHEM 4440 on an ongoing basis. Clearly we are seeing year to year variations in student performance, and this is to be expected. We raised the criterion from 75% to 80% the year before last and the students met the criterion on all but one exam. Last year the students met the criterion on all of the exams. Once again this year our students met the criterion on all of the exams. We know that there is year to year variation, but students continue to meet the criteria even with ever increasing numbers of students. We will raise the criterion for the 2015-2016 academic year to 82.5%.

Goal

Deliver A Curriculum With Appropriate Written And Oral Communication Skills Developed

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

Objective (L)

Demonstrate Adequate Written And Oral Communication

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.

Indicator

Chemistry Seminar Presentation

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.

Criterion

Acceptable Peer-Review Rating

All chemistry majors are required to receive an acceptable peer-rating on a required research presentation. Within the course, each student evaluates all other student presentations. The rubric is the last page of the syllabus. Over the years, we have found that peers tended to rate presenters rather highly. We hope to see more helpful feedback after providing additional instruction in constructive feedback.

Finding

Seminar Presentation

No significant change in CHEM 4100 student comments were observed this past year despite the new emphasis on constructive student comments.

Action

Seminar Action

Next year's seminar will include an even more in depth emphasis about student comments, and the resulting comments will be evaluated again.

Previous Cycle's "Plan for Continuous Improvement"

We assess the same courses year after year for our B.S. programs because the courses, the material, and the requirements of the American Chemical Society do not change. This means that our plans from year to year end up being remarkably similar.

This past year we demonstrated that offering two opportunities for qualified students to take the ACS exam over general chemistry resulted in much higher participation rates, so we will offer the exam at two different times in the spring semester. Depending upon the number of qualified students, we may do the same in the fall semester.

In the area of organic chemistry, we will monitor student performance on the standardized final and check instructor and time correlations. It may be appropriate to shift instructors to specific time slots.

In the area of instrumental analysis, we will monitor student performance through another cycle and see if raising the criterion yet again is appropriate.

We will continue to monitor student progress in physical chemistry, and issues related to time management will be addressed from the beginning of the course.

For the seminar, sample critiques and comments will be presented to students in hopes that more informative comments can be elicited.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

We offered students two opportunities to take the ACS exam over general chemistry in both the fall and spring semesters of the 2014-2015 academic year, but the participation rate was down compared to last year.

In the area of organic chemistry, once again the section that fills the most quickly when there are multiple sections has the lowest performance. This appears to be independent of instructor.

For physical chemistry, we will continue to monitor student progress. This past year, students were required to upload homework each week which attempted to force the students to do a substantial amount of work between lectures and exams, and hopefully made the students who did not do so to realize why they were doing poorly.

For intstrumental analysis, the students generally met the raised criterion.

For the seminar, the information provided thus far has not yet improved the quality of student feedback.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

As stated previously, we assess the same courses year after year for our B.S. programs because the courses, the material, and the requirements of the American Chemical Society do not change. This means that our plans from year to year end up being remarkably similar.

This past year we offered students two opportunities in the fall and in the spring for qualified students to take ACS exam over general chemistry, but participation rates fell compared to last year. This coming year we will again offer two opportunities to take the exam each semester, but we will endeavor to better advertise it to the students through multiple emails and instructor announcement(s).

In the area of organic chemistry, we will continue to monitor student performance on the standardized final and check instructor and time correlations. This may be a consequence of the registration process--more senior students register first which means that students who did poorly and are repeating the class register first and they may show up disproportionately in the class that fills fastest. This coming year we will pay more attention to the academic history of the students taking the exam.

In the area of physical chemistry, Dr. Williams will continue to stress issues related to time management through required homework assignments.

In the area of instrumental analysis, we will raise the criterion this year.

For the seminar, there will be an increased emphasis on constructive student comments.

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Chemistry MS

Goal — **Develop Presentation Skills**

The ability to communicate research and knowledge are fundamental presentation skills in chemistry.

Objective (L) — **Demonstrate Presentation Skills**

Students completing CHEM 5100 will, at least once during their tenure as graduate students, demonstrate the ability to make a research presentation.

Indicator — **Acceptable Student Seminar Peer-Reviewed Presentation**

During their tenure as graduate students, all students will present at least one departmental seminar. The faculty, through the peer-review evaluation rubric, will determine the presentation's acceptability.

Criterion — **At Least One Seminar Presentation**

All graduate students in chemistry are required to take CHEM 5100 at least once during their tenure as graduate students. To pass CHEM 5100, students are required to receive an acceptable peer-rating on a required research presentation. Within the course, each student evaluates all other student presentations. The rubric is the last page of the syllabus.

Finding — **Acceptable Presentations And Improved Critiques**

A new Faculty member was assigned the CHEM 5100 Seminar course starting Spring 2015. The addition of an early-semester discussion of the importance of critical suggestions to improvement of presentations and of the example comments in the syllabus rubric led to generally useful critiques as determined by the professor. All (100% of 16) presentations were deemed suitable by the student peer evaluators (as determined by a median score of at least 21 out of 30 points) and by the course professor (assigned score of at least 70 out of 100). The professor deemed the student comments to be almost entirely positive and helpful, but at times still overly brief. Students should put more time into the critiques.

Action — **Improve Time Allotted For Writing Critiques**

After each presentation, a set time period (5 or 10 minutes) should be allotted for writing up comments. Students will be required to spend this time thinking and writing up critiques. By doing this, the students will not benefit from finishing overly quickly by being extremely brief.

Goal — **Deliver A Curriculum With Appropriate Discipline Specific Knowledge**

The program will address the discipline specific knowledge dictated by professional societies and/or professionals in the workforce.

Objective (L)

Demonstrate Advanced Biochemistry Knowledge And Skills

CHEM 5372 "Advanced Biochemistry I" addresses detailed biochemistry concepts from a chemical perspective. It covers all major macromolecules, but with a strong focus on enzymes using cytochrome P450s as the model enzyme to explore in detail. Students are expected to understand enzymes and how they are studied at a level that allows critical analysis of primary literature in this field.

Indicator

Ability To Understand And Critically Analyze Primary Literature In Enzyme Biochemistry

Each student will present an appropriate literature article (selected by the student and approved by the instructor). On the final exam, each student will be required to answer questions on five (5) different papers discussed during the semester (out of 24 total). Each question will require the student to first summarize the paper's major findings, then to explain how a technique used in the paper works, then critically evaluate what the authors did not include in the paper that they should have or could have. The students will not know the nature of the questions before the exam, just that there will be one question for each article.

Criterion

Mastery As Demonstrated On Final Exam Questions

80% of students will score at least 80% (12 of 15 points) on 80% of the exam questions (4 out of 5 questions each student answered on this section of the final exam). Scoring will be done by the instructor.

Finding

Observed Mastery Of Advanced Biochemistry Of Enzymes

During the Fall 2014 semester, 100% of students (24) met the criteria. This is consistent with the instructor's overall evaluation that this was an unusually successful set of students. He deems it unlikely that this would be the case in other semesters.

Action

Increase Level Of Material And Stringency Of Criteria

During the next course offering, additional detailed material about spectroscopic methods used to study enzymes will be added as the students are capable of handling more material (although the fall 2014 semester was not deemed deficient, there is more material that can be added). Further, the criteria for success in the assessment will be increased to 85% of students scoring at least 85% on 100% of the literature questions.

Objective (L)

Demonstrate Understanding Of The Peer Review Process In Scientific Publications

The process of peer-review of manuscripts for the scientific literature is a fundamental part of science. Students in Analytical Spectroscopy (CHEM 5368, taught every 2 to 2.5 years) read and discuss published peer-reviewed literature articles

throughout this course (there is no assigned textbook). One of the objectives of this course is for students to learn the nuts and bolts of the systematic process of scientific peer-review. Mastery of the requirements for modern high quality technical scientific publication is required to meet one of the primary objectives of this graduate course in chemistry.

Indicator

Examination Of Student Understanding Of Scientific Peer Review

All students in the class are required to understand and correctly order the sequence of events, identify the players in the process (authors, editors, and reviewers), detail the feedback nature of the review process, and be able to critique both technical writing, figures, schematics, or imagery required in chemical publications.

Criterion

85% Of Graduate Students Meet Expectations

Eighty-five percent of graduate students taking the final exam in the class will score within one standard deviation of the mean or higher on a written question on the final designed to evaluate their mastery of the Indicator.

Finding

CHEM 5368 Results

Using a scientific manuscript that had been recently peer-reviewed from work carried out in the instructor's research group, the Spring 2015 CHEM 5368 course was modified to include a detailed description of the steps in the peer-review process, including the temporal variables involved in the process, the subject journal's editor's comments, comments from the anonymous reviewers, and examples of how the (ultimately accepted) manuscript was modified in response to the review process. And as the previous Action requires, a test question involving the peer-review process was included and the results showed an increase in student success from 85% scoring within 1 standard deviation (in Spring 2013) to 90% (in Spring 2015).

Action

Monitor Progress

Monitor the progress of the students and consider tightening the criterion. We raised it from 80% in 2012-2013 to 85% in the current year.

Objective (L)

Demonstration Of Quantitative Proficiency In The Calibration And Validation Of Chemical Sensors

CHEM 5385 (Nanoscience and nanosensing) provides an introduction to calibrated measurements of concentration within the context of nanoscience and nanosensing. The course begins by setting up a framework for calibrated measurements of concentration and then examines how the fabrication, design, function, and applications of nanosensors fit into and influence that framework. Readings are assigned from both textbooks and the primary literature. A key objective of the course is that students be able to quantitatively analyze raw sensor data for the purpose of making calibrated measurements of concentration, and that they be able to validate these measurements.

Indicator

Mastery Of Sensor Calibration And Validation Concepts

All students in the course will demonstrate their level of mastery of the concepts of sensor calibration and validation by their performance on a midterm examination devoted to these topics.

Criterion

Performance On Relevant Midterm Examination In CHEM 5385

80% of the students will score within 20% of the number of points of the highest scoring student on the relevant midterm exam, provided that the highest score obtains at least 85% of the available points. If the highest score is less than 85% of the available points, then the criterion will be that 80% of the students will score greater than 68% of the points on the exam.

Finding

Assessment Results From Fall 2014

91% of the students met the criteria on the relevant midterm exam in the Fall 2014 iteration of the course. The high score on this exam was 100%.

Action

Development Of A Greater Range Of Explanatory Examples Based On The Primary Literature

In future offerings of this course, more student exercises exploring potential pitfalls of calibration and how these can be identified in the validation procedure will be developed, along with a greater range of supporting problems based on new reports from the primary literature on nanosensors and nanosensing. The rigor and breadth of the relevant midterm exam will be correspondingly expanded.

Objective (L)

Demonstrate Advanced Organic Chemistry Knowledge And Skills

Organic reaction mechanisms is a broad area of organic chemistry that requires an understanding of the basic structural-electronic properties of organic molecules. CHEM 5362 is focused on the examination of alkylation, oxidation, reduction, substitution, elimination, rearrangement, and electrocyclic processes. As each topic is covered, in-class and out-of-class problems are assigned to give each graduate student ample practice and experience at applying the material. Since application is the central focus, all work involves open access to course materials.

Indicator

Mastery Of Advanced Organic Chemistry Knowledge

All students in this course will demonstrate their mastery of organic reaction mechanisms and their application to specific reactions through multiple applied problem sets and periodic topic focused examinations. Evaluation of the student's work is based on the appropriateness and acceptability of their answers based on current literature.

Criterion

Final Exam Performance In CHEM 5362

All (100%) of the students will score within 10% of the points of the mean percentage or higher and within

20% of the points of the high score on the final examination.

Finding

CHEM 5362 Results

During the Spring 2015 semester, 100% of the students scored within 10% of the points of the mean or higher and 93% were within 20% of the points of the high percentage for the class on the final.

Action

Inclusion Of Small Group Activities For Short In-class Presentations

In future offerings of the class, an increased number of small problem sets will be required in order to emphasize the necessity of applications to the understanding of the mechanism and use of organic reactions.

Previous Cycle's "Plan for Continuous Improvement"

The master's program is different than our undergraduate programs in a variety of ways. Most importantly for assessment purposes, with the exception of our seminar class (CHEM 5100), graduate research (CHEM 6398) and thesis (CHEM 6099), our courses are not offered every year. They aren't necessarily offered every other year--the frequency varies based on the instructors other demands and the needs of the students in the program.

For the seminar, sample critiques and comments will be provided at the beginning of the course.

For the course on polymer chemistry, the next time the course is offered, the instructor will require students to evaluate and summarize their peers' presentations, and these will be shared anonymously to the whole class.

For CHEM 5374, the next time the course is offered, the instructor will emphasize how students should create a sigma only molecular orbital energy diagram for octahedral metal complexes through homework assignments.

For physical organic chemistry, the next time the course is offered, the instructor will require peer evaluation of student presentations.

For industrial biochemistry, the next time the course is offered, the instructor will increase the emphasis on complex problem solving through the use of individual homework and group classroom assignments.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

For the seminar, the instructor for the course changed beginning with the spring 2015 semester.

Analytical spectroscopy was offered this cycle (and was addressed in the 2012-2013 "Plan for Continuous Improvement") and one of the instructor's manuscripts was used as an example of the review process (including editor and referee comments).

Organic reaction mechanisms was also offered this cycle (and was addressed in the 2012-2013 Plan). It isn't known if the instructor followed through with outlining the requirements for the final examination at the beginning of the semester. The students performed well in the class.

For the four courses mentioned in last year's Plan (above), they were not offered during the 2014-2015 year, so the changes could not be implemented this year, which is why the Plan stated "the next time the course is offered".

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

As pointed out previously, the master's program is different that our undergraduate programs in a variety of ways. Most importantly for assessment purposes, with the exception of our seminar class (CHEM 5100), graduate research (CHEM 6398) and thesis (CHEM 6099), our courses are not offered every year. They aren't necessarily offered every other year--the frequency varies based on the instructors' other demands and the needs of the students in the program.

For the seminar, the instructor plans on providing a set time period at the end of the presentation to give the students enough time to provide thoughtful critiques.

For CHEM 5372 "Advanced Biochemistry I", the next time the course is offered, the instructor will provide additional material about spectroscopic methods used in enzymatic studies, and the criterion will be raised.

For Nanoscience and Nanosensing, the next time the course is offered, there will be more student exercises exploring problems with calibration and validation, as well as more supporting problems from the primary literature.

The next time analytical spectroscopy is offered the criterion may be raised even further.

The next time organic reaction mechanisms is offered the instructor intends to increase the number of small problem sets required of the students.

Department of Computer Science

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Computing And Information Science MS

Goal

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

Graduates with a master degree in Computing and Informatoin 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.

Objective (L)

Understand The Body Of Knowledge Of Computer Science And Information Technologies

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

Indicator

Written Comprehensive Examination

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

Written Comprehensive Exams - Criterion

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.

Finding

Comprehensive Examinations

Based on last year's findings the following changes to the Comprehensive Examination system were implemented:

1. All thesis-option master students are exempt from comprehensive exams.

2. All project-option master students are exempt from the (comprehensive exams) subject tests if they have secured "A" in the corresponding core courses.

3. If a student failed in a certain subject, instead of being required to retake the written subject

exam in the next long semester, the student is required to take an oral subject exam where subject professor will focus examining student's weaknesses found in the failed subject exams.

The following results were obtained:

- In fall 2014 two students (out of 6) failed one or more content areas. Both students were successful in completing the newly established oral examination.
- In spring 2015 one student failed one content are. The student was successful in passing the oral examination.
- Students from prior semester who had failed one or more subjects successfully completed the comprehensive examination.

It appears that the changes introduced this year were successful in addressing prior problems with the comprehensive examinations. However more data is needed in order to demonstrate the long-term effectiveness of the changes.

Action

Comprehensive Examinations

Given the changes that were introduced this cycle, and the apparent positive result, the department does not intend to take further action at this point. The department takes the position that more data is necessary in order to more conclusively demonstrate that the new approach to comprehensive exams is consistent.

Objective (P)

Apply Knowledge And Skills In Projects And Real Work Environments

Students will practice and demonstrate their capabilities and skills relevant to computer information systems in projects similating real world tasks.

KPI Performance Indicator

Final Capstone Project Assessment

The final project in this degree program is a software engineering project that involves the students identifying a significant application development need for a selected client and the design and implementation of an appropriate software solution to that need.
Each student is assigned to a member of the graduate faculty in computer science 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.

Result

Final Capstone Assessment

Since the program implemented the individual proposals, instead of the previous group proposals, both students and faculty reported improved research focus and efficiency.

While most students did not encounter trouble finding and working on a proposed project, a couple of students struggled mainly because of lack of communications with professors.

Action

Final Capstone Assessment

The department has determined that the following actions should be implemented to improve the students' experience.

1. Students will be required to sign documents indicating that they have read and understand the requirements and timelines associated with the capstone project.
2. Project supervisors will document the attendance of students at the weekly progress meetings.
3. The department will introduce an early warning system, similar to 'First Alert' so that project committees and the Graduate Advisor are aware of performance problems at the earliest possible point.

Previous Cycle's "Plan for Continuous Improvement"

An intensive external program review and internal program evaluation and assessment was conducted in Spring 2014. See attachments for self-study report, and response to external review.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

The department has conducted an analysis of the external review conducted in the 2013-14 cycle. The following were implemented as a result:

•Changes to the comprehensive examination procedures as outlined previously.
•Changes to the documentation and reporting requirements during the capstone project process.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

The department has only one year's worth of data reflecting the changes to the comprehensive examinations and the capstone project assessment. The department takes the position that multiple years of data are required to determine the effectiveness of the changes.

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Computing Science BS

Goal

Specialized Competencies

To develop students' skills and knowledge in their concentration areas. The department offers three concentration areas: Computer Science, Information Systems, and Information Assurance.

Objective (L)

Specialized Skills

Students will develop and demonstrate skills and knowledge in their concentration areas. The department offers three concentration areas: Computer Science, Information Systems, and Information Assurance.

Indicator

Faculty Review

During department meetings faculty with expertise in the three concentration areas will discuss students' performances in their concentration areas. We expect that faculty in each concentration area will evaluate the students' performances across the 18 hours course sequence for each concentration.

Criterion

Specialized Skills Faculty Review Criterion

In last year's review the faculty assessed more than 70% of the students were performing at or above expected levels. As a result, the faculty set a higher expectation. We expect that the faculty will deem at least 72% or more of students' performances as acceptable.

Finding

Specialized Skills Faculty Review

During the academic year (2011-2012), Computer Science (CS) faculty developed indirect program assessment tools and rubrics to address the new ABET-CAC (Computing Accreditation Commission) criteria, which includes eleven Student Outcomes (SOs) ((a)-(k)). In particular, CS Department set up four Program Education Objectives (PEOs) (E01-E04). For the quantitative assessment and continuous improvement of the program, the tools and rubrics have been continuously used since the 2011-2012 academic year. The students in two courses, COSC4319 (Software Engineering) and COSC4349 (Professionalism and Ethics) participated in this indirect assessment every fall and spring semester since Spring 2012. In addition, another assessment tool, TASO (Test for Assessing Student Outcomes), was implemented for the direct assessment of the students' outcomes. This direct assessment was first performed in Spring 2013 and is also applied for this academic year as well.

The TASO results can be summarized as follows:

- Student performance has show small but continuous improvements since 2013 accros the 11 Student Learming Objectives

identified by, and measured by the department.
- Four Student Learning Objectives have been identified as requiring the most attention; the ability to apply knowledge of computing and mathematics appropriate to the discipline, the ability to analyze a problem, and identify and define the computing requirements appropriate to its solution, the ability to analyze a problem, and identify and define the computing requirements appropriate to its solution, and the ability to use current techniques, skills, and tools necessary for computing practice.
- Performance on the program's four Learning Objectives have shown steady improvement since 2013.

Action

Specialized Skills Faculty Review

During fall 2015 the Departmental Undergraduate Curriculum Committee will explore mechanisms for improving performance in the four Student Learning Objectives identified as those with relatively weak student performance. Those mechanisms will be implemented in the assessment process in spring 2016.

Goal

Ethical Principles, Technical Skills, And Management Skills (core)

To develop students' knowledge of ethical principles, technical skills, and management skills relevant to the field of computer science.

Objective (L)

Acquisition Of Technical Skill, Management And Ethical Principles

Students will develop and demonstrate knowledge of ethical principles, technical skills, and management skills relevant to the field of computer science.

Indicator

Capstone Project, Ethics Question, And TASO

All undergraduate CS students must complete COSC 4319 (Software Engineering) and COSC4349 (Professionalism and Ethics) prior to graduation. In addition, COSC4319, as a capstone course, covers the eight Student Outcomes (except the three outcomes (e), (g) and (h)) out of the eleven Student Outcomes and COSC4349 addresses the remaining three outcomes. Therefore, both the courses are selected for assessment. Additionally, TASO (Test for Assessing Student Outcomes) is implemented to quantitatively measure the eleven SOs. It is required for senior students to take it in senior-level Software Engineering course, prior to graduation regardless of their program concentration.

Criterion

Students' Performance On Capstone Project, Ethics Question, And TASO

To perform a quantitative assessment, the following rubrics for the two courses are developed: (1) rubric for Project, (2) rubric for presentation evaluation, (3) rubric for group member evaluation, and (4) rubric for ethics topics. For COSC4319, faculty members observe students' project presentation and directly evaluate students' performance based upon the rubrics (1)-(3). One the other hand, for COSC4349, students' performance is indirectly evaluated through the exam questions that address rubric (4). Each category is rated with the following scale values: (1) 1.0 (below expectations or unacceptable), (2) 2.0 (evolving or developing), (3) proficient (or competent), and (4) outstanding (or exemplary). Student's performance on Student Outcomes is directly evaluated with each specific rubric, while the performance on objectives is indirectly measured by mapping between Student Outcomes and Program Objectives.

Questions on TASO are based on topics from a number of required core courses (including COSC 1436, 1437, 2329, 3318, 3319, 4318, 4319, and 4349). Currently, it contains 26 multiple choice questions and 1 short answer question. Each multiple choice question has five choices, including the last choice of "I don't know". The percentage of students who select the correct answer to each given question will be computed and evaluated.

Finding

Students' Performance On Capstone Project, Ethics Questions And TASO

Student performance on the capstone project in COSC 4319 addresses 8 of the 11 ABET/CAC Student Outcomes. Fall 2013 and Spring 2014 results indicate somewhat improved performance in six of the eight student outcomes, with only one outcome(teamwork) showing no improvement.

The Ethics Test covers the three outcome that are not addressed by the Project assessment. One of the three student outcomes (Ethical responsibility) had a lower level than the previous academic year's level. The reamining outcomes (communication and evaluating local and global impacts) showed marked improvement.

Action

Acquisition Of Technical Skills And Management Skills

To improve confidence and significance of the analysis results, number of students, different weights for each outcome, and other factors should be considered. COSC4319 and COSC4349 do not have the same number of students, the difference in students' needs to be weighted properly. In particular, the UCC raised a concern on the number of students in each project, since it is difficult to measure each student's contribution, work, and learning. As a one solution, potential implementation of capstone courses was discussed

The level of attainment was evaluated by the CS UCC for each of the Student Outcomes (a)-(k) and the corresponding Program Education Objectives. Then, if needed, specific course contents have been revised to address the weaknesses. The TASO exam questions specifically on the topics of Software Engineering (Outcomes (i)-(k)) have been revised so as to more closely reflect the contents that are currently taught.

Previous Cycle's "Plan for Continuous Improvement"

As for periodic review and revision for continuous improvement of the program, the followings are planned for the next academic year:
(1) Continuing documentation of the review and revision plan,
(2) Continuing documentation of the utilization and revision of TASO exam as input into the continuous improvement process
(3) Assessment of student outcomes specific to each concentration (i.e., each of CS, IS, and IA concentrations),
(4) Continuing collection and analysis of the whole process and assessment of the implementation and effectiveness of the process.
(5) Initiation of the assessment to the newly-approved programs (e.g., Software Engineering Technology and Electronics and Computer Engineering Technology)

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

Items identified in last year's plan for continuous improvement have been implemented with the exception of item 5 (Initiation of the assessment to the newly-approved programs (e.g., Software Engineering Technology and Electronics and Computer Engineering Technology). The Computer Software Engineering Technology program begins fall 2015. As a result it was not possible to collect any data, and the students are not expected to generate data for TASO or the Software Engineering project assessment until spring 2017.
The Undergraduate Curriculum Committee will investigate a weighting mechanism to adjust TASO for difference in student numbers in the Software Engineering and Ethics courses to better represent their influence in the summary statistics.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

The Undergraduate Curriculum Committee will investigate a weighting mechanism to adjust TASO for difference in student numbers in the Software Engineering and Ethics courses to better represent their influence in the summary statistics.

The Undergraduate Curriculum Committee will review TASO and the Capstone project Assessment Mechanism to all differentiation and comparison between outcomes for Computing Science and for Computer Software Engineering Technology students.

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Digital Forensics MS

Goal

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

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.

Objective (P)

Apply Knowledge And Skills In Projects And Real Work Environments

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

KPI Performance Indicator

Final Capstone Project Assessment

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.

Result

Final Capstone Project Assessment

Since the program implemented the individual proposals, instead of the previous group proposals, both students and faculty reported improved research focus and efficiency.

While most students did not encounter trouble finding and working on a proposed project, a couple of students struggled mainly because of lack of communications with professors.

Action

Final Capstone Project Assessment

The department has determined that the following actions should be implemented to improve the students' experience.

1. Students will be required to sign documents indicating that they have read and understand the

requirements and timelines associated with the capstone project.
2. Project supervisors will document the attendance of students at the weekly progress meetings.
3. The department will introduce an early warning system, similar to 'First Alert' so that project committees and the Graduate Advisor are aware of performance problems at the earliest possible point.

Objective (L) **Understand The Body Of Knowledge Of Digital Forensics**

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

Indicator **Written Comprehensive Examination**

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.

Criterion **Written Comprehensive Exams - Criterion**

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.

Finding **Final Capstone Project Assessment**

Based on last year's findings the following changes to the Comprehensive Examination system were implemented:

1. All thesis-option master students are exempt from comprehensive exams.

2. All project-option master students are exempt from the (comprehensive exams) subject tests if they have secured "A" in the corresponding core courses.

3. If a student failed in a certain subject, instead of being required to retake the written subject exam in the next long semester, the student is required to take an oral subject exam where subject professor will focus examining student's weaknesses found in the failed subject exams.

The following results were obtained:

- In fall 2014 and spring 2015 no students failed the comprehensive examinations.
- Students from prior semester who had failed one or more subjects successfully completed the comprehensive examination.

The results are such that it is not possible to determine the effectiveness of the changes implemented during this cycle. Further data is needed.

Action

Final Capstone Project Assessment

The department has determined that the following actions should be implemented to improve the students' experience.

1. Students will be required to sign documents indicating that they have read and understand the requirements and timelines associated with the capstone project.
2. Project supervisors will document the attendance of students at the weekly progress meetings.
3. The department will introduce an early warning system, similar to 'First Alert' so that project committees and the Graduate Advisor are aware of performance problems at the earliest possible point.

Previous Cycle's "Plan for Continuous Improvement"

An intensive external program review and internal program evaluation and assessment was conducted in Spring 2014. See attachments for self-study report, and response to external review.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

The department has conducted an analysis of the external review conducted in the 2013-14 cycle. The following were implemented as a result:

•Changes to the comprehensive examination procedures as outlined previously.
•Changes to the documentation and reporting requirements during the capstone project process.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

The department has only one year's worth of data reflecting the changes to the comprehensive examinations and the capstone project assessment. The department takes the position that multiple years of data are required to determine the effectiveness of the changes.

Department of Geography and Geology

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Geographic Information Systems MS

Goal

Deliver A Curriculum With Appropriate Discipline Specific Knowledge

Students will learn the appropriate advance Applied GIS knowledge and skills.

Objective (L)

Demonstrate Advanced Applied GIS Knowledge And Skills

Each student will demonstrate the ability to communicate knowledge of advanced applied GIS.

Indicator

Mastery Of Advanced Applied GIS Knowledge - Written Comprehensive Exams

All graduate students will demonstrate a mastery of applied GIS knowledge through a set of written graduate comprehensive examinations, administered by a faculty committee. The examination will consist of questions about the practical and theoretical basis for the application of Geographic Information Systems and Remote Sensing techniques to real world problems. A committee of faculty members with expertise in the subject areas will evaluate students' performance and give a mark of Fail, Pass, or High Pass in each examined area.

Criterion

80% First Time Pass Rate For Written Comprehensive Exams

Each student needs to earn at least a "Pass" mark in each examined area to pass the written comprehensive exams. 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.

Finding

Performance On Comprehensive Exam

6 students took the comprehensive exam in Fall 2014. Each student formed a comprehensive examination committee comprised of 3 GIS graduate faculty members selected by individual student. Thus the comprehensive exam had 3 sections based on questions submitted by 3 comprehensive exam committee members.

2 students scored 'PASS' in all three sections. 2 students scored 'PASS' in two sections and 'PARTIAL PASS' in one section. 1 student scored 'HIGH PASS' in one section, 'PASS' in one section and 'PARTIAL PASS' in one section. One student scored 'HIGH PASS' in two sections and 'PASS' in one section. Thus, 3 students scored 'PARTIAL PASS' in one section, 2 students scored 'HIGH PASS' in at least one section and the remaining scored 'PASS' in all sections. All the three students with a 'PARTIAL PASS' scored it in same section and on re-taking that section passed it. Thus in Fall 2014 all the 6 students who took the comprehensive exam finally passed the exam with 2 students scoring 'HIGH PASS' in atleast one section.

In Spring 2015 6 students took the comprehensive exam. 3 students scored 'HIGH PASS' with one student scoring 'HIGH PASS' in all three sections and 2 students with a 'HIGH PASS' in one section. One student 'FAILED' two sections and will be re-taking the two sections in Fall 2015.

Action **Improving On Comprehensive Performance**

Compared to previous years more students have scored 'HIGH PASS' in one or more section. All 3 student students who have scored 'PARTIAL PASS' was in the section related to Spatial Analysis. GIS faculty have introduced more introductory topics on Spatial Analysis in order to reinforce student knowledge and skillset and make them more proficient in that particular subject matter.

Previous Cycle's "Plan for Continuous Improvement"

The Applied GIS faculty has continued to work to improve the quality of the program. The addition of a new faculty member in 2013, and the addition of new courses, have offered the opportunity to expand the scope of expertise available across the curriculum. Accordingly, we plan to broaden the subject matter and the range of skills incorporated within comprehensive examinations. In short, we plan to refine the comprehensive exam so that additional subject matter is explicitly assessed.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

3 new GIS graduate courses were offered in Spring 2015 and another new GIS graduate course was offered in summer 2015. These 4 new graduate courses that were offered in the 2014-2015 academic year covered four distinct areas of GIS thereby providing GIS graduate students an opportunity to enhance their GIS skillsets and making them more marketable. Also, starting Spring 2015 graduate students on thesis track are required to take a class on Research Methods. This will ensure that students who are on thesis track have the required skill sets to effectively conduct research and successfully complete their thesis work.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

The graduate GIS faculty continues to adopt strategies in order to improve the quality of the program. As number of GIS graduate students increases, we plan to broaden the subject matter and the range of skill sets that GIS graduate students learn. GIS faculty will continue to work on improving student knowledge related to Spatial Analysis. Another element of the graduate program that we plan to strengthen is the thesis track. In Fall 2014 the GIS graduate committee introduced a policy that required all graduate students on thesis track to take a class on Research Methods. This will ensure that students who are on thesis track have the required skill sets to effectively conduct research and successfully complete their thesis work. As part of continuous improvement the committee will adopt other approaches to strengthen the thesis track

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Geography BA

Goal — **Training Geographically Informed Students**

Students completing core education in geography will be able to demonstrate foundational knowledge of geographic principles and concepts about the physical world.

Objective (L) — **First-Year Foundational Geographical Principles And Concepts**

Students completing core curriculum education in geography will be able to demonstrate foundational knowledge of geographic concepts and principles, including critical thinking.

Indicator — **Comprehensive Final Exam**

Common embedded questions on the comprehensive final exam will determine student knowledge regarding general geographic concepts.

Criterion — **70% Accuracy**

The average scores will be 70% correct on the general geographic concept questions embedded in the comprehensive exam.

Finding — **Performance On General Geographic Concept Questions**

Students enrolled in GEOG 1401 (previously GEOG 1301) averaged 59% on a series of specific concept questions embedded in a comprehensive final exam. Students enrolled in GEOG 1321 averaged 76% on a separate, yet very similar, series of concept questions. Scores for GEOG 1401 students were consistent with overall overages on the respective final exams, while scores for GEOG 1321 students were actually noticeably higher that final exam averages. The scores among students enrolled in GEOG 1401 were slightly lower than those from the previous year, although the scores among those enrolled in GEOG 1321 once again improved slightly.

Indicator — **Comprehensive Final Exam - Geographic Principles Portion**

The final faculty-developed comprehensive exam will indicate students' grasp of major geographic principles, including critical thinking.

Criterion — **70% Principle Accuracy**

The average score will be 70% correct of the major geographic principles and critical thinking items embedded on the comprehensive exam.

Finding — **Performance On Questions Pertaining To Major Geographic Concepts And Critical Thinking**

Students enrolled in GEOG 1401 averaged 60% on a series of questions focused on competency with major principles and critical thinking skills that were embedded in a comprehensive exam.

Students enrolled in GEOG 1321 averaged 72% on a similar series of questions. Students enrolled in both courses consistently scored lower than expected on questions requiring the interpretation of graphs and charts, but scores for both courses did improve, particularly in the case of GEOG 1401. Students enrolled in GEOG 1401 averaged 57% on such questions, while students enrolled in GEOG 1321 averaged 68%. Students enrolled in both courses scored significantly lower than expected on questions requiring the interpretation of basic statistics, although scores for GEOG 1321 students improved significantly from the previous year. Students enrolled in GEOG 1401 averaged 52% on such questions, while those enrolled in GEOG 1321 averaged 59% on them.

Action

Improving Geographical Understanding Of Concepts And Principles

Students enrolled in GEOG 1321 continue to improve in regards to the level of competency in basic geographic concepts, major geographic concepts and in critical thinking. The same cannot be said for students enrolled in GEOG 1401, although students enrolled in this class did improve when it came to the interpretation of graphs and charts, a new priority for this class. However, it is probably not totally fair to compare the two classes directly, as they really do serve different purposes. By far, the majority of students enrolling in GEOG 1401 do so in order to fulfill a lab science requirement, while GEOG 1321 attracts students with some interest in the subject matter (although it does also fulfill a core requirement). Perhaps more importantly, most sections of GEOG 1321 enroll much smaller numbers of students. Nevertheless, we deem it necessary to continue to try to replicate some of what works in GEOG 1321 (group exercises, for example) in the lab portions of GEOG 1401. Students enrolled in both courses did improve when it came to the interpretation of basic statistics, although they still score below the designated acceptable level. We fully expect our efforts to emphasize this subject matter across the entire program to reap recognizable benefits as we go forward.

Objective (L)

Demonstrate Knowledge Of Foundational Concepts Of Physical Geography

Students completing the core education in geography will demonstrate knowledge of physical geography including the world in spatial terms, places and regions, and physical systems.

Indicator

Physical Geography Concepts

Students will correctly answer the embedded questions on exams throughout the semester that address physical geography. The areas of emphasis include the world in spatial terms, places and regions, and physical systems.

Criterion

70% Accuracy On Physical Concepts

Students will score 70% correct on those questions pertaining to each of the three areas of emphasis concerning physical geographical concepts.

Finding

Student Results Concerning Physical Geography Concepts

Students enrolled in GEOG 1321 scored on average 68% on those questions pertaining to the world in spatial terms. This score is slightly lower than the score found the previous year, and slightly lower than expected. Students enrolled in GEOG 1401 scored on average 61% on questions assessing this concept, less than expected and slightly lower than that of the previous year. Students enrolled in GEOG 2301 scored on average 73 % on these questions, a scorer higher than expected. Students enrolled in both GEOG 1321 and GEOG 2301 scored on average 71% on questions pertaining to concepts of places and regions, a higher score than was found the previous year (for GEOG 1321 at least), and a score that does meet expectations. Students enrolled in GEOG 1401 scored on average 62% on such questions, a higher score than realized previously although it still did not meet expectations. In those two assessment areas, students generally performed as well as they did on exams as a whole. Students enrolled in GEOG 1321 scored 67% on questions pertaining to physical systems, while students enrolled in GEOG 1401 scored 65% on such questions. Both scores were slightly increased from that of the previous year. Students enrolled in GEOG 2301 scored on average a 74% on these questions.

Action

Improving The Learning Of Physical Geography

There still remains considerable room for improvement in the delivery of basic concepts of physical geography and concepts pertaining to the world in spatial terms. Scores for students enrolled in both GEOG 1321 and GEOG 1401 declined from the previous year in regard to these subject matter. However, students do seem to be adequately learning physical geography in a separate course (GEOG 2301) which was just newly assessed this past year. Both GEOG 1321 and GEOG 1401 were recently redesigned but because they both serve specific core curriculum needs, the amount of time and energy that can be devoted to physical geography is limited. Environmental Geography (GEOG 2301), by comparison, is specifically designed around this subject matter. Likewise, GEOG 2355 and 2356 are specifically designed to focus attention on the “world is spatial terms,” thus their future inclusion in assessment may provide a better view of how well our students are actually doing in regards to this subject area. We are optimistic that we will come closer to meeting the expected level once students from these two courses are assessed.

Goal

Demonstrate Knowledge Of Cultural Concepts In Geography

Students completing the core courses required for a Geography degree will demonstrate knowledge of cultural geography including both human systems and the interaction between the environment and society.

Objective (L)

Demonstrate Knowledge Of Cultural Concepts In Geography

Students completing the core courses required for a Geography degree will demonstrate knowledge of cultural geography including both human systems and the interaction between the environment and society.

Indicator

Cultural Geography Concepts

Students will correctly answer the embedded questions on exams during the semester that address cultural geography. The areas of emphasis include human systems and the environment and society.

Criterion

70% Accuracy On Cultural Concepts

Students will score 70% correct on those questions pertaining to each of the two areas of emphasis associated with cultural geography concepts.

Finding

Student Learning Outcomes Concerning Cultural Concepts

Students enrolled in GEOG 3350 scored an average of 72% on a set of questions focused upon human systems. Students enrolled in GEOG 1321 and GEOG 2301 scored an average of 69% and 71% on those same questions. Students enrolled in GEOG 3350 scored 69% on questions concerning the interaction of the environment and society, while students enrolled in GEOG 1321 scored an average of 66% on these questions. The scores on these questions were below expectation for both courses, but they did increase significantly from the previous year. Students enrolled in GEOG 2301 scored on average of 73%, which is above expectation.

Action

Improving The Learning Of Cultural Geography

It would appear that the teaching of human/cultural geography is a departmental strength, as students are learning this material at a higher level than other subject matter assessed. This almost certainly relates to the fact that the majority of the faculty have expertise in human geography (as opposed to physical/environmental geography). This finding is also due to the fact that students enrolled in these courses are disproportionately older. Morevoer, far more of them are majoring in the field, compared to those enrolled in other courses. In future assessments, we plan on formulating the assessment so we can get more specific insight into particular sub-areas of cultural geography. For example, are there certain subject or geographic areas that students are more comfortable with, compared to others areas? Are they more or less familiar with religion, or the culture of Latin America? Addressing more specific aspects of cultural geography would provide insight how to continue to improve in this subject area.

Previous Cycle's "Plan for Continuous Improvement"

Many of the weakenesses identified by student outcomes from this assessment represent weaknesses that have also been recognized on previous assessments. To that effect, we have proactively redesigned some of our courses to better serve the need for enhanced critical critical thinking and to faciliate the learning of both basic and major geographical concepts. We have also attempted to replicate methodologies proven to be efffective in some courses (GEOG 1321) so that they could be implemented in other courses. Some of these methodologies, when applicable, will be implmented in lab sections, so that we can take advantage of the intimacy of smaller class sizes. We plan to further improve upon this overall endeavor by incorporating the assessment of additional courses that better serve certain specifc goals, such as sections of World Regional Geography and Environmental Geography. These courses should offer a better test of how well our students are learning "regions and places" and "physical systems," respectively. Perhaps the biggest change we have made involves our efforts to fix the identifiable need to enhance student understanding of basic statistical measures, a weakness reflected within this assessment. Based on these results, we have restructured our degree requirements so that all geography majors will be required to successfully complete a basic statistics course. In addition, we have also incorporated some elementary statistical procedures within one of our introductory geography courses (GEOG 1321). Finally, we plan to continue efforts at experiementing with different ways to enhance learning across our curriculum as a means to generate positive learning outcomes.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

The most signficant change we implemented across the curriculum pertaining to last cycle's "plan for continuous improvement" relates to the requirement that all geography majors complete a basic statistics course. At this point, only students following the most recent catalog year are required to abide by this change, so its still too early to see the full impact of this new requirement. However, results from this past assesssment suggest that students enrolled in one introductory course (GEOG 1321) significantly improved upon questions requiring the interpretation of basic statistics. We feel this improvement could very well result from this new degree-specific requirement. This improvement probably also stems from the more inclusive implementation of statistical content in GEOG 1321, another change garnished from last year's assessment. As outlined in the plans from last cycle, this past year we also incorpirated the assessment of the newly offered GEOG 2301 (Environmental Geography) course into the OATDB. It is noteworthy that students in all courses assessed demonstrated improvements in regards to the display of knowledge pertaining to the study of "physical systems." We are confident that we have enhanced the teaching of this content via the regular offering of this new course (GEOG 2301). Our long terms plans also called for us to assess student learning within both sections of World Regional Geography (2355 & 2356), particularly when it comes to the assessment of learning pertaining to "world regions." However, we faced challenges doing so simply because the past year witnessed faculty using all time and energies devoted to these course as a means to ensure they where effectively fitting into the newly designed Core Curriculum. In short, while these courses were aasessed, departmental focus was on meeting newly revamped university-wide requirements as opposed to meeting the needs of assessment efforts. We have preliminary results from the assessment of these courses, but these results are not yet tabulated in a form to be presented here. Now that the "new" content of these two courses are mostly set, we anticipate fully incorporating them within assessment recording next cycle.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

Based on the assessment of 2014-2015, it would appear that we have improved somewhat in the teaching of both basic and major geographical concepts, but only among students completing one of our introductory courses (GEOG 1321) assessed. Students enrolled in GEOG 1401 demonstrate scores that are persistently below the acceptable level. As identified earlier in earlier assessments, the dichotomy in regards to learning outcomes between the two courses is almost certainly due to the fact that the various sections of GEOG 1401 offered included rather large classes (over 80 students). These larger sections of GEOG 1401 (Weather & Climate) also enroll a cross-section of studies from across the university, as opposed to a disproportionately higher number of majors (which is the case with GEOG 1321). For this reason we plan to continue to more assertively implement methodologies that seem to work in GEOG 1321 into the smaller "lab" sections of GEOG 1401. The inclusion of a new course within the curriculum (GEOG 2301) seem to enhance the learning of physical systems among our students, an effect that seemed to prevail across all courses. For this reason, we plan to use the results of this assessment to explore the potential addition of more new courses that could prove valuable in increasing the learning of "niche" content critical to the realization of a geographic education (maybe an in-house statistics course designed specifically for geography majors?). Our most immediate plans call for the inclusion of two more of introductory courses in assessment efforts (GEOG 2355 & 2356). Given that these courses are designed to focus explicitly on subject matter pertaining to "world regions," a major learning goal of geography majors, we feel the incorporation of them in assessment efforts will help provide a clearer picture of what our students are learning and what they are not learning.

Department of Mathematics and Statistics

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Mathematics BA / BS

Goal

Deliver A Lower-Level Curriculum With Appropriate Discipline Specific Skill Sets

The curriculum will provide freshman and sophomore students with opportunities to develop the skills typically required of professionals in the area of study.

Objective (L)

Foundation Areas - Differential Calculus

MATH 1420 (Calculus I): 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, and using calculus techniques to solve optimization problems.

Indicator

Course Assessment - MATH 1430

All students enrolled in the program are required to complete Mth 142. Students will be administered a final exam developed and approved by the department faculty. The exam will require them to demonstrate the knowledge and skills mentioned in the objective.

Criterion

Optimization Using Calculus Techniques

On the final exam, 70% of the students will use appropriate calculus techniques to solve an optimization problem.

Finding

Results From 2015 -- Optimization

Only 50% of respondents to an optimization problem on a set of final exams submitted a correct response. This is not acceptable. One set of exams had an admittedly difficult optimization problem on it.... but a success rate of less than one half is not acceptable to the department. The mathematicians in the department (16 of 30) will meet in Fall 2015 to discuss a plan of action.

Criterion

Differentiation Of Mathematical Functions

On the final exam, 70% of the students will provide the correct derivative for a given mathematical function.

Finding

Results From 2015 -- Differentiation

Students traditionally have less of a problem with computational exercices such as finding derivatives than with conceptual problems such as optimization. It is therefore not surprosing that 77% of our students correctly computed the derivative of a selected function. With more than 2/3 of the course devoted to computing derivatives, most students should be familiar with the various techniques and rules of differentiation.

Criterion

Fundamental Theorem Of Calculus

On the final exam, 70% of the students will correctly use the Fundamental Theorem of Calculus to evaluate a given integral.

Finding

Results From 2015 -- FTC

On the Spring 2015 final exams, 59% of respondents correctly completed the problem on the fundamental theorem of calculus. This is a topic covered at or near the very end of the semester.... so it should be fresh on the mind of students.

However, we have found that many students often have final exams during the last week or even the last two weeks of classes... a problem that is not only a violation of academic policy, but more often than not distracts students from providing their full attention to their other courses at the end of the semester.

We are not as alarmed about the lower than expected performance on this topic, for the simple reason that the material is reviewed during the first week of Calculus II (MATH 1430). But we will discuss the low success rate during Fall 2015.

There are no actions for this objective.

Goal

Improve Communication Between Department And Its Majors

Communicate to our mathematics majors more and better information pertaining to internships, research opportunities, scholarships. etc.

Objective (P)

Improve Communication Between Department And Mathematics Majors

Communicate to our mathematics majors more and better information pertaining to internships, research opportunities, scholarships. etc.

Action

Improving Communication / marketing

One weakness mathematicans (and most scientists?) have is a lack of willingness or skill in marteting ourselves and our disciplines. We often find it difficult to convince students to study mathematics: if they like it, they will continue studying it; if they don't then they probably shouldn't continue their studies.

But this is a disservice to our particular group of students: those from familes with no or few college graduates, and little career guidance in inaccessible fields such as mathematics.

In Fall 2016 we are beginning to meet with Jana Richie from the university's marketing office. They are going to help us advertise the successes of our program, identify our weaknesses, and recruit area high school and transfer students. While we have the desire and willingness to find and recruit new students, we lack the expertise or the means to do so. Hopefully, this will help us not only attract

more students to our degree program, but also help our existing students find better careers once they earn their degree in mathematics.

Goal

Deliver An Upper-Level Curriculum With Appropriate Discipline Specific Knowledge

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

Objective (L)

Advanced Areas For Majors

Students preparing to graduate will demonstrate advanced mathematics knowledge and skills.

Indicator

Euclidean Geometry Project - Math3363

Students will complete a project on the role of proof and technology in communicating mathematics.

Criterion

Project Assessment

At the end of the semester, 70% of the students submitting their project will receive a rating of 8 out of 10 or better according to the attached rubric.

Finding

Results From 2015 -- 3363

Because of low enrollment in this course, a report of this finding was not conducted in Spring 2015.

There are no actions for this objective.

Previous Cycle's "Plan for Continuous Improvement"

We have plans to apply for 3 different NSF grants: two interdisciplinary STEM-centered projects that will improve our STEM course offerings, and one research grant (PI: J. Wang).

We will hire two new faculty members, in the hopes of increasing our breadth of our graduate and advanced undergraduate course and research offerings. We also hope to find new colleagues that have interests in community outreach and the development of a STEM center on our campus (one of the goals of the NSF grants mentioned above).

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

We hired two new mathematicians, both with considerable experience teaching at the undergraduate level.

One of our new hires (Dr. Daniel Wang) fills a speficic need in our analysis group. In his first two years he will teach both our year-long undergraduate analysis sequence (a pair of courses tradiatially reported by our students as the most difficult of our curriculum) and our year-long graduate sequence. Dr. Wang has been trained in the technique of inquiry-based (student-centered) learning, and we plan on his expertise in this area to be influential in retaining our upper-level mathematics majors.

Dr Candice Price was also hired with several years experience in the classroom. An applied topologist (specifically DNA topology), Dr. Price will surely prove to be transformative to our mathematics program. She has received external funding from the NSF, and is already planning on submitting additional proposals.

In January 2016 we will submit a $2-3 million NSF grant to establish a STEM-center on campus, increasing retention and quality of math, chemistry, biology and engineering technology majors. In addition, the department will support a proposal to the Howard Hughes Medical Institute proposal submitted by a member of the Department of Biological Sciences. Obtaining external funding remains a priority of the department.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

The undergraduate mathematics program has several ideas for improvement. These include, but are not limited to, the following:

1. Continue to apply for external (usually federal) funding to improve the quality of our undergradute offerings. In particular, summer bridge programs have been shown to increase the preparation of math and chemistry students. We are very interested in adapting existing, successful programs to our curriculum. Another example is encouraging the further use of Inquiry-Based Learning (IBL) in our upper-level classrooms, as well as in other disciplines on campus. IBL has been shown to be successful with particular groups of mathematics students (women, minority students, and relatively underprepared students).

2. Designing a 5-year combined BS/MS program in mathematics for motivated, talented first year students. This will not only help us graduate more students with a higher earnings potential and less student debt, it will force us to market our program more effectively (or at all).

3. Continuing to encourage and foster research with undergraduate students. We will offer for the first time in Spring 2016 a course (MATH 4395) in which students perform a semester-long research project (along with discipline-specific professional development activities) with a faculty mentor. Students have regularly in the past done research at this level, but for the first time we have in place a system for them to receive credit towards their degree.

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Statistics MS

Goal — **Deliver A Curriculum With Appropriate Discipline Specific Skill Sets**

The curriculum will provide students with opportunities to develop the skills typically required of professionals in the area of study.

Objective (L) — **Foundation Areas In Probability And Statistics**

Students will have a working knowledge of the foundational topics including regression analysis, design of experiments, multivariate analysis, and mathematical statistics (Bayesian analysis, biostatistics, quality control, nonparametric statistics, sampling theory, Time Series Analysis, and statistical computing).

Indicator — **Comprehensive Oral Examination**

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 of the material according to a previously agreed upon rubric with three levels of comparison: High Pass, Pass, and Fail.

Criterion — **Mulitvariate Analysis**

All candidates will receive a mark of either "High Pass" or "Pass" for the Multivariate Analysis component of the comprehensive oral exam. The rubric used is the same one shown in the "Mathematical Statistics" criterion.

Finding — **Multivariate Exam 2014-2015**

All the students passed the exam at their first attempt.

Criterion — **Regression Analysis**

All candidates will receive a mark of either "High Pass" or "Pass" for the Regression Analysis component of the comprehensive oral exam. The rubric used is the same one shown in the "Mathematical Statistics" criterion.

Finding — **Regression 2014-2015**

All the students except one students passed the exam at their first attempt.

This student successfully completed exam at his second attempt.

Criterion — **Mathematical Statistics**

All candidates will receive a mark of either "High Pass" or "Pass" for the Mathematical Statistics component of the comprehensive oral exam.

Finding — **Mathematical Statistics 2014-2015**

All the students except one students passed the exam at their first attempt.

This student successfully completed exam at his second attempt.

Criterion **Design Of Experiments**

All candidates will receive a mark of either "High Pass" or "Pass" for the Design of Experiments component of the comprehensive oral exam. The rubric used is the same one shown in the "Mathematical Statistics" criterion.

Finding **Design Of Experiments 2014-2015**

All the students passed the exam at their first attempt.

Action **Foundation Areas In Prob And Stat 2014-2015**

We are going to encourage the students start getting ready for the oral exam early enough so that they won't be stressed out with work load at the end of the program. As faculty, we are going to remind them frequently.

Goal **Deliver A Curriculum That Emphasizes Communication Skills**

The curriculum will provide students with opportunities to develop the appropriate speaking and writing skills to function as a professional in the area.

Objective (L) **Communicating Mathematical Ideas - Oral**

Students will be able to prepare and deliver oral presentations of mathematical material based on a statistics practicum. Students will devlop the ability to critique problems, and provide their own solutions based on statistical analysis.

Indicator **Statistics Practicum**

A statistics practicum, under the guidance of one of the faculty members, and assessed by a committee of four 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 communicative abilities. The committee will then judge the candidates' ability to effectively communicate mathematical ideas according to a previously agreed upon rubric with three levels of comparison: High Pass, Pass, and Fail.

Criterion **Practicum Assessment**

All candidates will receive a letter grade by the members of the examining committee during the practicum assessment according to the attached rubric.

Finding **Practicum 2014-2015**

All the students successfully finished their practicum and received letter grades A. They also presented their work at a regional conference. One student received the award for the best project in his category.

Action **Communication 2014-2015**

Encourage the current students present their work at conferences. Utilize the writing center more so that students can improve their writing skills.

Goal **Consistent Cohort Of Graduate Students Each Year**

A cohort of ten supported graduate students each year allows us to maintain a healthy program with consistent class sizes and class schedules.

Objective (L) **Support Ten New Students Each Year**

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 fulltime students are supported by at least $10,000 more than the cost of tuition

and fees.

Action **Support Students 2014-2015**

We asked more TA positions and increase of the stipend but was not successful due to budget restrictions in the university. Situation is getting worse due to the increase of tuition.

Goal **Improve Instruction By TAs**

We will improve our instructional support for TA instruction in our elementary Statistics courses.

Objective (L) **Encourage And Train Teaching Assistants For Teaching**

Will encourage and assign teaching assistants in elementary statistics courses as instructors.

Indicator **Evaluation TA**

Teaching evaluations and classroom visits by faculty

There are no actions for this objective.

Previous Cycle's "Plan for Continuous Improvement"

We need more TA positions to have a healthy cohort of students. And also current TA stipend is not adequate. Our students are struggling financially due to low stipend and we are planning to communicate this to the university administration. Need at least one more faculty member. We need more office space for students.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

We asked more TA positions and increase of the stipend but was not successful due to budget restrictions in the university. Situation is getting worse due to the increase of tuition. We also asked for a new faculty line; this is also not given due to budget restrictions of the university.

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

We need more TA positions to have a healthy cohort of students. And also current TA stipend is not adequate. Our students are struggling financially due to low stipend and we are planning to communicate this to the university administration. The environment even harder for the international students due to the same reason. Need at least one more faculty member. We need more office space for students.

Department of Physics

SAM HOUSTON STATE UNIVERSITY

Online Assessment Tracking Database

Sam Houston State University (SHSU)
2014 - 2015

Physics BS

Goal

Provide The Necessary Basic Skills For Beginning Students In Physics, The Physics/engineering Dual Degree And Pre Engineering Programs

The Department of Physics provides discipline-specific offerings for beginning students in physics, the dual degree in physics/engineering and pre engineering

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Objective (L)

Apply Foundational Concepts

Students who complete the second course in calculus based Physics will be able to apply foundational concepts, particularly in the areas of (1) proofs and derivations, and (2) translation of written problems into mathematical equations.

Indicator

Comprehensive Exam

Students will complete a faculty-developed comprehensive exam in Physics 1411 assessing the common foundational concepts in Physics.

Criterion

80% Score 70% Or Higher

Eighty percent of students completing the exam will score 70% or higher on the comprehensive exam.

Finding

Results Of Physics 1411 Testing

This report documents the global gains in pre/post examination performance of 34 students enrolled in Physics 1411 during the Spring of 2015. It additionally compares the differential gains made by two sub-populations, consisting of 11 students (group A, primarily physics and pre-engineering majors), who had previously completed the new “Physics Bootcamp” (PHYS 1401), and 23 students (group B, about half math with the remainder phys, pre-eng, other) who had not. The bootcamp functions largely as a quantitative leveling and preparatory agent.

Both groups had approximately the same academic age. Respective classification indices for groups A, B were 2.6, 2.4 (with Freshman = 1, Soph. = 2, etc).

Group B was more experienced in formal mathematics, with 1.3 average semesters of calculus completed, as opposed to 0.6 for group A.

Group A had a slight advantage (0.7,0.4) with regard to previously completed semesters of physics education, awarding a half point for high-school credit, general science exposure, and incomplete college terms.

The exam consisted of 20 multiple choice physics questions appropriate to the study of introductory classical mechanics at the university level. A quarter point deduction was made for incorrect answers in order to subtract out statistical background noise associated with guessing, and negative values were zeroed out. Absolute scores were converted to percentile form. Normalized results will be reported in units of the inclusive (all students) standard deviation of 12 percentile points associated with adjusted scores on the pre-test.

Both groups fared poorly, but similarly, on the pre-test of physics concepts, with adjusted normalized scores of 0.6, and 0.9 (0.8 for class overall).

Both groups improved similarly, and significantly, in their post-test scores, with normalized marks of 1.8 and 2.3 (2.1 overall), representing a percent improvement of 190%, 150% (160% overall).

Conclusions: All students made significant gains in physics knowledge, but the two sub-populations could not be significantly discriminated in terms of initial or final performance. Participants in the "Physics Bootcamp" fared comparably to classmates with more formal math training, suggesting that this experience is providing a benefit approximately commensurate to one semester of calculus. The results presented are preliminary and additional statistical support is required. No effort has been made to calibrate against standardized college entry scores.

Action **Continue To Collect More Data.**

Although the results are enocuraging, the numbers are small. We will continue to collect more data.

Action **Collect More Data**

We will continue to collect more data. The results are encouraging but there are a number of confounding factors and more data is needed to obtain a scientifically meaningful result.

Goal **Competence For Bachelor Of Science**

Seniors studying Physics will demonstrate competence to graduate with a Bachelor of Science in Physics

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Objective (L) **Mastery Of Fundamental Principles In Physics**

Students preparing to graduate with a BS in Physics will demonstrate comprehension of fundamental principles and the ability to apply these principles in solving problems.

Indicator **Previous GRE Subject Test In Physics**

Students will complete a common earlier version of the Graduate Record Subject Exam in Physics related to PHY 4370 (Classical Mechanics) under GRE standardized conditions. Faculty will have classified the questions into domains specific to the major principles in this area.

Criterion **Above 50th Percentile**

Students will score above the 50th percentile determined as a result of the graduating seniors' scores from the common exam. A raw score of 50% is in the 74th percentile for the Physics GRE with a ¼ penalty for wrong answers.

Finding **Results Of Physics 4370 Testing**

On the first day of class, 11 students scored an average of 1.7. On the last day of class, 7 students scored an average of 2.8.

Action **Collect More Data For 4370**

We will continue to study the effect of working harder problems and teaching the students when to use Lagrangian methods.

Previous Cycle's "Plan for Continuous Improvement"

The “Physics Bootcamp”, which functions largely as a quantitative leveling and preparatory agent, has successfully compensated for a full semester deficit of formal training in calculus, when gauged by final outcome. The results presented are preliminary and additional statistical support is required.

The emphasis in physics 4370 on when to use the Lagrangian and when to use Newton's laws directly has appeared to improve performance on the GRE.

Again, the sample size is small and additional statistical support is needed.

Please detail the elements of your previous "Plan for Continuous Improvement" that were implemented. If elements were not implemented please explain why, along with any contextual challenges you may have faced that prevented their implementation.

Previous elements were implemented**.**

Plan for Continuous Improvement - Please detail your plan for improvement that you have developed based on what you learned from your 2014 - 2015 Cycle Findings.

More data collection is necessary before any meaningful conclusion can be reached.