Mission / Purpose
The mission of the Department of Physical Sciences is to provide students with a strong background in the disciplines of physical science and to prepare students for further study in graduate or professional schools or for successful careers in chemistry or related fields. Emphasis is placed on the development of enhanced skills in critical thinking, communication, computer literacy, and modern technology as related to the field of chemistry.

I. Goals and Student Learning Outcomes/Objectives, with Related Measures, Targets, Findings, and Action Plans

A. Goal: Address the major education issues of the region
Address the major educational, social, cultural, and economic issues of the region and in doing so promote a positive self-image of the institution and the area.

1. Outcome: Provide students with quality programs
Provide students with quality programs and prepare them for careers and/or graduate school.

a. Measure: Review current offerings and investigate the addition of new programs
The department will review current offerings for chemistry majors and offer new programs as need is determined. The objective here being to make the chemistry program more marketable to incoming students, while maintaining a high standard for academic performance.

1. Achievement Target:
All chemistry degree tracks will be reviewed and revisions made as needed. Emphasis will be given to the creation of new program offerings as need is determined.

2. Findings (2011-2012) - Target: Met
The current degree tracks were reviewed and it was determined that no revisions are needed at this time.

2. Outcome: Students will demonstrate a working knowledge in their major field of study
Students will demonstrate a working knowledge of the principal subfields of chemistry, including analytical, biological, inorganic, organic, and physical chemistry.

a. Measure: Evaluation of select exam questions from each subfield of chemistry
Select questions from examinations in one course from each of the five major fields of chemistry will be examined to determine students' proficiency in each field. Courses used for this evaluation will include: CH 242- Organic Chemistry II, CH321- Quantitative Analysis, CH 351- Physical Chemistry, CH 431- Inorganic Chemistry, and CH 471- Biochemistry.

1. Achievement Target:
An average score of 75% will be obtained by students in order to demonstrate proficiency in each of the major fields of chemistry. The selected questions will be designed to encompass multiple concepts within the field.

2. Findings (2011-2012) - Target: Partially Met
The average scores for the selected questions in each of the target courses are listed below: CH242: 41.0%, CH321: 73.9%, CH351: 88.7%, CH431: N/A, CH471: 51.1%. (No data is given for CH431 since this course is on a 2-year rotation and was not offered this year.) Average scores for CH242 and CH471 were significantly short of the target value. The Department of Physical Sciences is currently investigating methods to improve student proficiency in these areas.

3. Action Plan:
Improve student proficiency in each field of chemistry
In order to improve student proficiency in each of the fields of chemistry, instructors will increase the offering of tutorial and problem solving sessions. This should result in increased understanding of chemistry.
Established in Cycle: 2011-2012
Implementation Status: In-Progress
Priority: High
Implementation Description: Increase the offering of tutorial and problem solving sessions.
Responsible Person/Group: Roger Campbell
Additional Resources Requested: None

3. Outcome: Students will demonstrate the ability to read, evaluate, and interpret information
Students will demonstrate the ability to read, evaluate, and interpret numerical, chemical and general scientific information.

a. Measure: Analysis of select questions related to evaluation and interpretation of information
The extent to which students are able to successfully demonstrate the ability to read, evaluate, and interpret numerical, chemical and general scientific information will be determined by analyzing average scores on select questions from comprehensive final examinations in CH 471- Biochemistry, and CH 422- Instrumental Analysis.

1. Achievement Target:
Students will demonstrate proficiency in reading, evaluating, and interpreting numerical, chemical and general scientific information by
obtaining an overall average of 75% or higher on the comprehensive final exam and a 75% or higher on select problems/questions to determine more specific strengths and weaknesses in content areas.

2. Findings (2011-2012) - Target: Not Met
For CH422, three questions were selected to evaluate the students' ability to interpret data. The average score for these three questions was 70.4%. For CH471, one multi-part question was selected. The average score for this question was 53.1%. Though the target was not met, scores have improved slightly since the last assessment. The Department of Physical Sciences will continue to introduce more activities which stress data analysis and interpretation.

3. Action Plans:
   a. Development of additional activities targetted at interpretation of data
      Since assessment of data interpretation skills indicated a need to enhance this skill in students, faculty will work to produce additional exercises that will develop this skill in students. This will specifically target 300 and 400 level courses, but will also be included in lower level courses.
      Established in Cycle: 2010-2011
      Implementation Status: In-Progress
      Priority: High

   b. Incorporation of additional exercises to develop interpretation skills
      Since assessment of data interpretation skills indicated a need to enhance this skill in students, faculty will work to incorporate more exercises to develop this skill in students. This will specifically target 300 and 400 level courses, but will also be included in lower level courses.
      Established in Cycle: 2011-2012
      Implementation Status: In-Progress
      Priority: High
      Implementation Description: Faculty will work to incorporate more exercises to develop data interpretation skills in students.
      Responsible Person/Group: Roger Campbell
      Additional Resources Requested: None

4. Outcome: Students will gain working knowledge of basic lab and research methodologies, data analysis and interpretation
Students will gain working knowledge of basic laboratory and research methodologies, data analysis and interpretation.

   a. Measure: Student participation in and successful completion of lab assignments
      Students will demonstrate a working knowledge of basic laboratory and research methodologies, data analysis and interpretation through participation in and successful completion of select lab assignments from CH 321- Quantitative Analysis, CH 351- Physical Chemistry, CH 471- Biochemistry, and CH 422- Instrumental Analysis.
1. **Achievement Target:**
   Student scores on select lab assignments will meet or exceed 75% for each content area identified in the assignment. Assignments are scored using a rubric to evaluate proficiency in lab technique, procedure, analysis of results, and reporting of findings.

2. **Findings (2011-2012) - Target: Met**
   Based on the analysis of the selected lab assignments for CH321, this target was met. Five lab assignments were selected for this evaluation, with average scores being 85.7%. This indicates that students are gaining a working knowledge of lab skills and analysis of lab data.

3. **Action Plan:**
   **Enhancement of lab evaluations**
   Further lab assignments will be developed that will better assess student learning in specific areas. The assignments will be designed to specifically extract learning data in the areas of lab procedure, research skills, data analysis, and reporting of experimental findings.

   **Established in Cycle:** 2010-2011
   **Implementation Status:** In-Progress
   **Priority:** High

   a. **Measure:** Increase the use of technology in the chemistry labs.
      The use of technology will become more widespread in experiments performed in the chemistry labs.

   1. **Achievement Target:**
      Labs involving technology will be added to courses at the freshman level. At least two technology-based experiments will be added to 100 level courses. Additional use of technology will be investigated for upper level courses with particular attention given to analytical chemistry courses.

   2. **Findings (2011-2012) - Target: Met**
      Two technology-based experiments were added to the general/introductory series. One experiment focuses on freezing point depression and is used in CH112. The other experiment investigates the gas laws and is used in CH111 and CH101.

5. **Outcome:** Students will demonstrate the ability to search and use chemical literature and communicate findings
   Students will demonstrate the ability to search and use the chemical literature in both printed and electronic formats and communicate findings clearly and effectively.

   a. **Measure:** Completion of written and oral assignments
      By successfully completing written and oral assignments in CH 480, Forensic Chemistry, students will demonstrate the ability to search and use chemical literature and communicate findings clearly and effectively. Each assignment is graded using a rubric that will evaluate specific content areas of the
assignments such as content, format, and oral presentation.

1. **Achievement Target:**
   Student papers and oral presentations will be scored using a rubric to judge strengths and weaknesses in different areas. Students are expected to meet or exceed an average of 75% on each paper or presentation.

2. **Findings (2011-2012) - Target: Met**
   Based on the evaluation of written and oral assignments in CH422, this target was met. The assignment was evaluated based on content, format, and oral presentation with the average score being 84.0%. This indicates that students are becoming proficient using chemical literature to produce written and oral reports.

6. **Outcome: Students will understand and follow proper safety procedures in the lab**
   Students will know the proper procedures for safe handling and use of chemicals and understand how to work safely in a laboratory.

   a. **Measure: Administer a standard safety quiz in all lab courses**
      Students will obtain a minimum score on a standardized safety quiz administered in a laboratory sections. This quiz is designed to assess the students' understanding of basic lab safety procedures and chemical handling. A minimum score on the quiz is a requirement for participation in lab experiments.

   1. **Achievement Target:**
      Students will demonstrate an understanding of basic lab safety and chemical handling by completing a standard lab safety quiz. An average score of 90% will be maintained within the lab courses offered in the department. A minimum score of 80% will be required in order to participate in lab experiments.

   2. **Findings (2011-2012) - Target: Met**
      An average score of 95% was attained by students in chemistry lab courses. This indicates that students are gaining an exceptional understanding of the safety rules and procedures.

II. **Goals and Other Outcomes/Objectives, Related Measures, Targets, Findings, and Action Plans**

   A. **Goal: Address the major education issues of the region**
      Address the major educational, social, cultural, and economic issues of the region and in doing so promote a positive self-image of the institution and the area.

   1. **Objective: Establish an efficient system for chemical inventory control**
      In order to better maintain an accurate chemical inventory, the department would like to purchase and install a computerized inventory system for tracking its chemical inventory. Such a system would incorporate the use of a barcode scanner for container identification.
a. **Measure:** Establish an efficient inventory system for chemical storage.  
In order to better maintain an accurate chemical inventory, the department would like to purchase and install a computerized inventory system for tracking its chemical inventory. Such a system would incorporate the use of a barcode scanner for container identification.

1. **Achievement Target:**
   Purchase and install a computerized chemical inventory control system. This will include a computer, inventory control software, and barcode scanner.

2. **Findings (2011-2012) - Target: Not Met**
   Funding has not yet been received for the software and equipment. The system cannot be purchased and installed until funding is received.

3. **Action Plan:**
   Install inventory system
   Installation of the chemical inventory system will take place when funds are received.
   
   **Established in Cycle:** 2011-2012  
   **Implementation Status:** Planned  
   **Priority:** High  
   **Implementation Description:** Install inventory system  
   **Responsible Person/Group:** Roger Campbell  
   **Additional Resources Requested:** Request for funding made in previous budget cycle.

B. **Goal:** Improve the financial status by seeking additional funding from public and private sources.
Improve the financial status of the department by increasing its efforts at productivity and by seeking additional funding from public and private sources.

1. **Objective:** Submit proposals for external funding
Submit proposals to public and private sources for research funding. The department will strive to submit one proposal per year to a funding agency.

a. **Measure:** Submit proposals for external funding
   Faculty will work closely with the Office of Sponsored Programs to complete these proposals.

1. **Achievement Target:**
   The department will submit one proposal per year.

2. **Findings (2011-2012) - Target: Met**
   Dr. McDonald submitted grant for $197,000 to the National Science Foundation entitled, “The University of West Alabama ADVANCE IT-Catalyst Project, NSF proposal: 1209146.”

III. Other Plans for Improvement:
A. Continue working on grant applications
Faculty will continue working on the preparation of grant applications.
Established in Cycle: 2009-2010
Implementation Status: In-Progress
Priority: High

B. Purchase a chemical inventory tracking system.
Purchase chemical inventory software, computer, label printer, and barcode scanner to maintain an accurate chemical inventory.
Established in Cycle: 2011-2012
Implementation Status: Planned
Priority: High
Budget Amount Requested: $2,500.00 (recurring)

C. Replace HPLC in the instrumentation lab.
The existing HPLC in the instrumentation is out-dated and needs to be replaced.
Established in Cycle: 2011-2012
Implementation Status: Planned
Priority: Medium
Implementation Description: Secure funding and seek bids for replacement of HPLC.
Responsible Person/Group: Roger Campbell
Budget Amount Requested: $25,000.00 (recurring)

IV. Analysis Questions and Analysis Answers

A. What specific strengths did your assessments show? (Strengths)
The assessment results indicate that Physical Sciences faculty are effective in providing students with a good background in lab safety and the understanding of laboratory procedures. Students are also being prepared to effectively research and prepare written and oral presentations.

B. What specific weaknesses or challenges did your assessments show? (Weaknesses)
Students faced difficulty in areas related to the interpretation of data in the classroom. Steps were taken that improved these abilities, but additional work will be required.

C. What plans were implemented?
Development of additional activities targeted at interpretation of data enhancement of lab evaluations. Incorporation of additional exercises to develop interpretation skills.

D. What plans were not implemented?
Installation of a chemical inventory tracking and control system. Replacement of the HPLC system in the analytical chemistry lab.

E. How will assessment results be used for continuous improvement?
The assessment results have indicated some areas that need improvement. Based on these results, the department will be implementing programs that will improve student learning in the areas which were below the target.

V. Annual Report Section Responses

A. Key Achievements
   The Pre-Pharmacy track in the Chemistry Comprehensive degree was made available to students.
<table>
<thead>
<tr>
<th>Item</th>
<th>Approved</th>
<th>Remarks</th>
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<tbody>
<tr>
<td><strong>Goals</strong></td>
<td>YES</td>
<td></td>
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<tr>
<td>Goals are broad statements describing what the unit wants to accomplish. Goals relate to both the unit's mission and the University's mission. The goal(s) is stated as the University goal(s) a unit is attempting to meet.</td>
<td>NO</td>
<td></td>
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<tr>
<td><strong>Outcomes/Objectives</strong></td>
<td>YES</td>
<td>Needs minor edit</td>
</tr>
<tr>
<td>Outcomes and objectives are statements that describe in some detail what the unit plans to accomplish. Outcomes/objectives are associated with all applicable goals, strategic plans, standards, and institutional priorities.</td>
<td>NO</td>
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</tr>
<tr>
<td>Objectives are active-verb descriptions of specific points or tasks the unit will accomplish or reach. Outcomes are active-verb descriptions of a desired end result related to student learning and the unit's mission.</td>
<td>YES</td>
<td></td>
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<tr>
<td><strong>Measures</strong></td>
<td>YES</td>
<td></td>
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<tr>
<td>Measures are statements to judge success in achieving the stated outcome or objective. Measures contain information on the type of evidence and assessment tool that a unit will use to verify if stated outcome/objective has been met.</td>
<td>NO</td>
<td></td>
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<tr>
<td><strong>Achievement Targets</strong></td>
<td>YES</td>
<td></td>
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<tr>
<td>Achievement targets are the thresholds that the measures must meet for the unit to determine that it has been successful in meeting its specified outcomes/objectives. Achievement targets are measurable statements.</td>
<td>NO</td>
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### SELF-STUDY

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<thead>
<tr>
<th>Item</th>
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<tbody>
<tr>
<td><strong>Findings</strong> Findings are indications whether an outcome/objective was met or not. Findings are put into the system under each achievement target. Findings include an interpretation of results, possible uses of results, reflection on problems encountered, indicated improvements/changes and strengths or weakness.</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Action Plans</strong> Action plans are detailed plans created by the unit to meet an outcome/objective that was only partially met or not met or to make improvement to those outcomes/objectives that were met but still need some strengthening. The plan includes a projected completion date, implementation description, responsible person(s)/group, resources required, and budget amount (if applicable).</td>
<td>YES</td>
<td>NO</td>
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<tr>
<td>Action plans created in previous cycles have been updated with implementation notes.</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Annual Report</strong> The Annual Report section contains information on key achievements, faculty and/or staff achievements, and community/public.</td>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td><strong>Analysis Report</strong> The unit has reflected on and created narratives for each of the following areas: specific strengths and progress made on outcomes/objectives, specific weaknesses or challenges, plans that were and were not implemented, and how assessment results will be used for continuous improvement.</td>
<td>YES</td>
<td>NO</td>
</tr>
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Approved by: [Signature of Dean or Vice President]

Received by OIE: [Signature of Coordinator of Planning and Assessment]

Date: 7/26/11

Date: 8-10-12