

# **LIFE AND PHYSICAL SCIENCES**

## **FOUNDATIONAL COMPONENT AREA JUSTIFICATION FORM**

Rationale: Please provide a rationale for the course which explains how the course being proposed fits into this component based on the component's description. For your convenience, the overall description and rationale for this component are included below.

Life and Physical Sciences (from THECB Chapter 4: 4.28)

Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method.

Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.

The following four Core Objectives must be addressed in each course approved to fulfill this category requirement: Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills, and Teamwork.

- Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information;
- Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication;
- Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions;
- Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

### **Rationale for Inclusion in this Category:**

**Chemistry** is a basic science focused on the study of matter and its changes and interactions. College Chemistry I and II are the standard foundation courses in which students are introduced to the concepts of chemistry. Lectures focus on describing and explaining natural phenomena using the scientific method, and the student is required to use the knowledge gained to explain and predict observations on quizzes and exams. Each course also has a required laboratory component in which the student performs experiments utilizing empirical, quantitative, and critical thinking skills. Some experiments also involve teamwork and require written and oral communication skills,

**STUDENT LEARNING OUTCOME ALIGNMENT FORM**  
**Life and Physical Sciences**

**Course Prefix/Number: 108**

**Course Title: College Chemistry II**

**Core Objective: Critical Thinking** CT1: Students will evaluate evidence in analysis, interpretation or arguments

Course SLO(s): Students will demonstrate the ability employ critical thinking skills.

Learning Activities: Students are presented problems in Mastering Chemistry (online homework – Pearson), lecture quizzes and exams, and laboratory exercises in which they are presented data that they must analyze and interpret.

Means of Assessment: Students in all sections of Chemistry 108 take a standardized American Chemical Society Examination, and the student's performance will be assessed based on their mastery of specific questions addressing this SLO. The target goal is that 70% of the students will demonstrate 70% mastery of these questions.

**Core Objective: Critical Thinking** CT2: Students will synthesize varied components of information to form a rational conclusion.

Course SLO(s): Students will demonstrate an understanding of the principles of scientific inquiry.

Learning Activities: Students are presented problems in Mastering Chemistry (online homework – Pearson), lecture quizzes and exams, and laboratory exercises in which they are presented data that they must analyze and interpret.

Means of Assessment: Students in all sections of Chemistry 108 take a standardized American Chemical Society Examination, and the student's performance will be assessed based on their mastery of specific questions addressing this SLO. The target goal is that 70% of the students will demonstrate 70% mastery of these questions.

**Core Objective: Communication** C1: Students will express ideas in written, visual or oral forms to a range of diverse audiences in multiple settings.

Course SLO(s): Students will demonstrate the ability to clearly and concisely state their observations of chemical phenomena and their conclusions based upon these observations in a manner that is easily understood by the instructor and their laboratory partners.

Learning Activities: Students perform a series of 11 laboratory experiments in Chemistry 108. Two of these experiments (10 and 11) are done individually, and the remainder are done with a laboratory partner. All experiments require submission of a data sheet showing all data collected, all calculations, and results/conclusions. Four of these experiments (1, 2, 4, and 7) also require preparation of a graphical analysis, and Exp. 2 requires oral interaction of groups. Two experiments (2 and 4) require submission of an additional formal written lab report.

Means of Assessment: Students will be evaluated based upon accuracy of their observations and their reasoning and data processing in reaching conclusions from their observations on the data sheets. Lab Reports are scored using a rubric. The target goal is that 70% of the students will demonstrate 70% mastery in all of the above activities.

**Core Objective: Empirical and Quantitative** EQS1: Students will gather, interpret or use numerical data/observable facts to arrive at an informed conclusion.

Course SLO(s): Students will be instructed on how to perform laboratory experiments, collect data, make observations, and reach conclusions based upon these observations. The students will then be presented with unknown samples on which they will conduct their own experiments.

Learning Activities: Students will be presented with unknown samples and required to perform data collection, data correlation, and analysis to identify or determine the concentration of their unknowns in Laboratory Experiments 1, 4, 9, and 7. The students then report their data, calculations, and conclusions on the lab report sheet.

Means of Assessment: Students are assessed on the accuracy and precision of their data, the accuracy of their calculations, and the accuracy of the final conclusion. The target goal is that 70% of the students will demonstrate 70% mastery in all of these activities.

**Core Objective: Teamwork** TW1: Students will work in coordination to complete specific tasks.

Course SLO(s): Students will work in teams and coordinate their efforts during two laboratory experiments to increase their efficiency in data gathering and will work as teams to generate formal written lab reports for these experiments.

Learning Activities: Students will work in teams of 8 students and coordinate their efforts during laboratory experiments 2 and 5. The students will work in pairs in each experiment to gather their data, then the four pairs at each lab table will gather as a team to analyze their data and reach conclusions about the phenomenon observed. The groups will then work together outside of the lab to prepare a formal written laboratory report.

Means of Assessment: Each pair of students will turn in their individual report sheets, which will be scored in the usual manner. The formal lab report will be scored using a rubric. In addition, each student will submit an evaluation of the effectiveness of the team and its individual members, which will be incorporated into individual scores. . The target goal is that 70% of the students will demonstrate 70% mastery in both the individual and group portions of these activities.

As department head, I will ensure that all faculty that teach this course are aware of the requirements that these core objectives and learning strategies be incorporated into the above referenced course. This action is taken so that Tarleton State University will be in compliance with Texas Higher Education Coordinating Board foundational component area and core objective requirements for the General Education Core Curriculum.

Signature\_\_\_\_\_

We, the undersigned faculty, support the proposed changes to this course and agree to incorporate them into our section of the above referenced course. This action is taken so that Tarleton State University will be in compliance with Texas Higher Education Coordinating Board foundational component area and core objective requirements for the General Education Core Curriculum.

*(Signed document should be kept in department office, listing names below on the electronic document implies acceptance)*