IDC Proposal:

“Chemistry Safety Net” To Improve the Retention Rates And Success of CHEM1110 Students

Proposal Submitted by:

________________________________
Jerry Burns
Garry Pennycuff
Brad Rose
Natural and Behavioral Sciences Department
03/04/2010

Proposal Approved by:

________________________________
Jim Kelley
Department Head, NBS
Chemistry Safety Net

I. Project Overview

A. The Problem.

CHEM1110, General Chemistry I, has a success rate of only approximately 50%, success being defined as passing with a grade of “C” or better. Several of the major factors contributing to the low rate of success for CHEM1110 are:

1.) Students often lack both the self confidence and the study skills required to succeed in the sciences.
2.) A substantial majority of students complete their secondary education without developing the necessary abilities to succeed in chemistry including:
   a.) Fundamental mathematical skills
   b.) Analytical thinking and reasoning skills
3.) Due to the generally competitive nature of science, as well as the specific majors that most of our CHEM1110 students are interested in (pre-med, pre-vet, pre-pharmacy, pre-dental), they are required to take this course early in their academic career, often before they’ve had sufficient time to thoroughly absorb the mathematics required in the course.

The factors described above work collectively to make chemistry not only a challenge but a dreaded course for many students.

Many students lack not only one but several of the contributing factors to failure described above. Unfortunately, the only recourse these students have is to fail or withdraw from the course their first time through and then try again the next semester. By that point, they are demoralized and have developed a mental block to learning chemistry. Those students that do persevere and pass after subsequent attempts, often get by with a “C”. This may present problems in transferring to four-year universities, not to mention gaining acceptance to a post-baccalaureate professional institution.

A potential solution to this problem may be to direct motivated students at high risk of failure to withdraw from their CHEM1110 course and during the same semester, enroll in alternative 5 week “rescue course” that will focus on the topics most students tend to struggle with, namely, stoichiometry, chemical nomenclature & oxidation states and electron configuration.
B. Proposed Solution:

Establish a Chemistry Rescue Course, analogous to Biology’s Boot Camp for A&P.

1. Course Format
Our proposal is to establish an emergency rescue course in the form of a classroom setting during the last five weeks Fall Semester. The course will be designed to help improve students’ self confidence and analytical thinking skills. Analytical thinking is critical to success in chemistry and can be developed within the context of reviewing the foundational topics of General Chemistry. Thus, both the analytical thinking skills (process) and fundamental concepts (content) will be developed simultaneously.

2. Course Activities
The format for this course would be similar to a web-enhanced, fast track course with bi-weekly 2 hour meetings along with a robust on-line component.

3. Student Participant Selection
By the second exam in CHEM1110, it is usually obvious which students will and will not succeed in the course. Those students not passing the course will be guided to the course instructor for an interview and evaluation. Students who show interest will be offered the chance to participate in the alternative course. Since this is a trial run, only the first 50 students to volunteer will be allowed admittance into the course.

C. Expected Results

Presumably, graduates of the Chemistry rescue course will be better prepared to pass the course during their subsequent attempt at CHEM1110 the following semester. If the course works as planned, higher course retention rates the following semester should be observed.

II. Additional Project Information

A. Consistency of Project to IDC Purposes
This is an innovative approach to preparing students for a difficult course. More successful students will stay enrolled in their programs and retention should increase.

B. Links to College and Departmental Goals
This project supports the School’s FOE program by increasing the likelihood of students actually passing CHEM1110 on their second attempt.
C. Cost Efficiency Considerations
   If this pilot program works, then we will see an increase in the number of students passing CHEM1110 and moving on to CHEM1120.

III. Project Evaluation:
   This project will be evaluated by comparing the pass rates of students who have taken this chemistry rescue course against those who have not when the rescue course students re-take CHEM1110. We can collect data on pass rates from previous years (Fall 2007 to Spring 2009) as well as data from the test semester. Additionally, rescue course students may be interviewed or surveyed at the end of the program to see where the format, content or specific activities may be improved. A final report on this project will be completed after Fall 2010 when the pass rates for rescue course students becomes be available.

IV. Course Evaluation:
   Since students would withdraw from their regular CHEM1110 course, their transcript will show a grade of “W”. No grade would be assigned to this short course and it would not appear on their transcript. Rather, their transcript would simply show that they withdrew from CHEM1110 during their first attempt and received whatever grade they receive during their subsequent attempt.

IV. Course Budget:

A. Materials:
   No special materials for this project are needed other than already existing copying and computing resources and classroom availability. A special D2L course will be requested to provide the on-line enhancements for this class.

B. Release Time:
   3 Release Hours for the project facilitator: $1,830.00
   (3 hrs x $560/hour + $150 for office hour)
   This time will be used to:
   1.) Develop the course syllabus, lesson plans and learning activities.
   2.) Create and maintain the D2L on-line enhancement.
   3.) Conduct the course during the last 5 weeks of the semester.
Appendix:
Course Activity Schedule

Week 1:
Day 1: Dimensional Analysis
Day 2: Dimensional Analysis

Week 2:
Day 3: Basic atomic structure, oxidation states
Day 4: Chemical nomenclature I

Week 3:
Day 5: Chemical nomenclature II
Day 6: The mole and balancing chemical equations, Chemical nomenclature III

Week 4:
Day 7: Stoichiometry, Chemical nomenclature IV
Day 8: Stoichiometry, Chemical nomenclature V

Week 5:
Day 9: Stoichiometry, Chemical nomenclature VI
Day 10: Stoichiometry, Chemical nomenclature VII