LSC Use Only Proposal No:	UWUCC Use Only Proposal No: 11-125f

Proposing Departmen[illegible]

[illegible] apply)

New Course | Course Prefix Change | Course Deletion

X Course Revision | X Course Number and/or Title Change | X Catalog Description Change

Current course [illegible] Chemistry I

[illegible] (please mark [illegible] appropriate [illegible] categories below)

[illegible] Learning Skills | X Knowledge Area | Global and Multicultural Awareness | Writing Intensive (include W cover sheet)

[illegible] Studies Elective (please mark the designation(s) that [illegible] must meet at [illegible])

[illegible] Technological Literacy

3. Other Designations, as appropriate

Honors College Course | Other: (e.g. Women's Studies, Pan-African)

Catalog Description Change | Program Revision | Program Title Change | New Track

New Degree Program | New Minor Program | Liberal Studies Requirement Changes | Other

Part II.

New Syllabus of Record

1. Catalog Description

CHEM 113 Advanced General Chemistry I (3c-3l-4cr)

[redacted]

others, or harm to the environment.

3. Detailed Course Outline

Advanced General Chemistry I is intended to be a single lecture section with multiple lab sections. Ideally , one instructor will cover lecture and lab, although in some semesters, additional instructors may

8. Chemical Bonds 4 hours

Ionic Bonds. Covalent Bonds. Lewis Structures. Octet Rule. Exceptions to the octet rule.

9. Molecular Structure 4 hours

[redacted]

6. Undergraduate Course Attendance Policy
The University expects all students to attend class. The attendance policy for this course will be consistent with the Undergraduate Course Attendance Policy in the IUP Undergraduate Catalog.

7. Required textbook(s)
Lecture: Atkins, P., Jones L., *Chemical Principles, 5th ed.,* W.H. Freeman, NY, 2010.

Laboratory: Abraham,M. R.; Pavelich, M. J., *Inquiries into Chemistry,* Waveland Press, Inc., Prospect Heights, Il.,1999. (This laboratory manual has an older publication date, but remains one of the best guided inquiry chemistry laboratory manuals available.)

8. Special Resource Requirements

Safety: Some approved form of eye protection must be worn at all times in the laboratory. Students who do not comply with this regulation will be required to withdraw from the course.

Students are expected to have their own scientific calculators and access to a computer to use the

computer-based programs and web-sites that provide supplementary materials. Some sections of the course may utilize on-line course materials as part of the instruction.

9. Bibliography
Brown, T.E., LeMay, H.E., Bursten, B.E., Murphy, C., Woodward, P., *Chemistry: The Central Science*, 12th ed., Prentice Hall, New Jersey, 2012

Garratt, J., Threlfall, R., Overton, T. *A Question of Chemistry: Creative Problems for Critical Thinkers,*

SAMPLE ASSIGNMENT

AIR BAGS 'R US

John Woolcock

Based on experiments developed by Jim Klent and Angelica Steen (ChemConnections)

Scenario:

In this experiment, you have been asked by your boss, I.M. Gaseous, of the AIR BAGS 'R US Co., to investigate the design of a small-scale airbag system they want to produce as a child safety device for

[redacted]

analysis. These issues, as well as the quest for better and cheaper systems, drive the search for other compounds and formulations for the gas-producing reaction used in the system.

The Ideal Gas Law and Mass-Mole Relationships

In the reaction shown above, the CO_2 gas produced obeys the Ideal Gas Law. In fact, at normal temperatures and pressures, all gases obey the Ideal Gas Law. This law combines together all the major properties of a gas: pressure (P), volume (V), temperature (T), and amount (n) or moles of gas. The algebraic expression of this law is:

$$PV = nRT$$

where P is the pressure of the gas in atmospheres (atm); V is the volume of gas in liters (L), n is the moles of gas (mol), T is the temperature of the gas in Kelvin (K), and R is the Ideal Gas Law Constant. The value of R is 0.0821 atm L mol^{-1} K^{-1}. With this equation and the measurement of any three properties, the fourth property can be calculated.

In most laboratories, the properties of P, V, and T are often measured in units different from those used in the Ideal Gas Law. In the lab, pressure is typically measured in *mm Hg* (millimeters of mercury) or *torr*

n_1 = number of moles of gas in the standard state (1.0 mol)
n_2 = number of moles of gas needed for the experiment
V_1 = volume of a gas in the standard state (22.4 L)

T_1 = temperature in the standard state (273 K)
T_2 = temperature of the experiment (current room temperature)

Pre-lab Questions

Complete these problems using the information above before coming to lab. Show your work.

- You should calculate the exact amounts of solid $NaHCO_3$ and 6 M HCl solution that are needed to produce just enough gas to create a cushion of the largest possible volume without breaking the seal on the bag. Record the amounts you use below.
- The trigger and deployment system should require minimal external parts or assistance.
- You should have the acid and the $NaHCO_3$ inside the airbag in a stable configuration that will survive handling without deployment until triggered.
- You will want to measure the thickness of the bag and how fast it inflates.

Address the following issues:

1. List safety considerations for testing your airbag, including handling and disposing of chemicals.
2. Show all calculations and reaction equations that were needed to predict the amounts of reagents predicted to fill the air bag.
3. Describe or sketch the design of your airbag, including the mechanism that you use as a trigger in the deployment. After each test of the airbag, empty all waste into the sink. The bags may be rinsed in the sink and wiped out with a paper towel to dry them for the next trial.

PART III.

Optimization of the Airbag Design

Once you have a successful airbag design that you can operate, use your model to determine if changing the amount of one or both of the reactants changes the speed of inflation or creates a better/poorer

Report

In addition to the tables and information above, explain the experimental variables you adjusted to optimize your airbag. Include why you chose the amounts you did, and why you think that the best airbag was made with those amounts (particularly if the amounts were different from those calculated from the balanced equation). Assess the quality of your airbag, and make suggestions for improvement.

[redacted]

Sample Assessment

CHEM 113: Grading Rubric for Air Bags 'R Us

Problem Questions

[redacted]

- Each problem gives a word equation, number substitution, and shows appropriate unit analysis. Answers are numerically correct, with the correct number of significant figures and correct units. (5 points each; 15 points total)

Part I

- Clear explanation given of how the volume of the airbag was found(5 points)

2. Summary of the proposed revisions.

1. Course title change from "Concepts in Chemistry I" to "Advanced General Chemistry I"
2. Pre-requisite addition of minimum MATH SAT score and high school chemistry
3. Catalog Description change
4. Change in course objectives to fit expected student learning outcomes
5. Minimum Lab Grade of 70% required for passing course.
6. Updated course text and bibliography
7. [redacted]

[redacted]

3. Justification/rationale for the revision.

1. **Course title and pre-requisite changes** reflect the target audience for the course. The revision to Advanced General Chemistry is designed to improve retention of science majors. CHEM 111 (General Chemistry I) is an existing liberal studies Natural Science course for science majors that does not have any pre-requisites. CHEM 113 (Concepts in Chemistry I) was a Liberal Studies Science, freshman chemistry course for primarily chemistry majors, with a guided inquiry-based laboratory program that was designed to develop critical thinking skills. Over time, it has become [redacted]

OLD SYLLABUS OF RECORD FOR CHEM 113
CONCEPTS IN CHEMISTRY

I. CATALOG DESCRIPTION

COURSE TITLE: CHEM 113, Concepts in Chemistry
NUMBER OF CREDITS: 4 cr (3c-3l-4sh)
PREQUISITES:
COURSE DESCRIPTION: Introductory course for chemistry majors. Topics covered include atomic theory, an introduction to chemical reactions, bonding, molecular geometry, gas laws, the

LECTURE

1. Introductory Concepts — 5 lectures

Scientific measurement systems and units. Problem-solving chemistry. The periodic table of the elements. Chemical formulas and nomenclature.

2. Introduction to Inorganic Reactions — 4 lectures

Writing and balancing chemical equations. Types of chemical reactions: acid-base, precipitation, oxidation-reduction, combustion.

3. Stoichiometry — 4 lectures

11. Pressure-Volume-Temperature Relationships – Gas Laws

12. Decomposition of Alka-Seltzer – Gas Laws
13. Heating and Cooling Behavior – Solution Theory

IV. EVALUATION METHODS

The laboratory grade will make up 25% of the overall grade. Evaluation consists of quizzes, hourly exams, assignments and a final exam. The final exam usually contributes 25-30% of the lecture grade. The laboratory grade is

Liberal Studies Course Approval General Information

1. This course will have one lecture section. The lecture instructor will serve as course (lecture and lab) coordinator. All lab sections will do the same set of experiments. There is a department guideline standard evaluation procedure for all sections that requires a student to earn 70% in the laboratory portion of the course in order to pass.

2. Many important discoveries and advances in chemistry come from women and ethnic minorities:

the 1800s, George Washington Carver's contributions to plant chemistry, the periodic table described

From: Anne E Kondo <akondo@iup.edu>
Date: 02/13/12 10:45 AM
To: luciano@iup.edu, hovan@iup.edu, talwar@iup.edu, mbriggs <lkup@iup.edu>, bharathn@iup.edu

This message has attached files. Show

Dear Colleagues,

Attached, please find course revision proposals for CHEM 112 and CHEM 114

(Concepts in Chemistry I and II). In the past, enrollment in these courses has been restricted primarily to chemistry, chemistry education, biochemistry and geology majors; the lab has been guided-inquiry. To better serve both well-prepared science

Liberal Studies Course Approval Checklist
Instruction Sheet

Use this checklist for all Liberal Studies categories other than writing-intensive sections—a different

checklist is available for this. If you have questions, contact the Liberal Studies Office, 103 Stabley, telephone 357-5715.

This checklist is intended to assist you in developing your course to meet IUP's Criteria for Liberal Studies and to arrange your proposal in a standard order for consideration by the Liberal Studies Committee (LSC) and the University-Wide Undergraduate Curriculum Committee (UWUCC). When you have finished, your proposal will have these parts:

_X___ Standard UWUCC Course Proposal Cover Sheet, with signatures and Liberal Studies course designation checked

_X___ Course syllabus in UWUCC format

___ UWUCC course analysis questionnaire. Needed only if this is a new course not