LSC Use Only Proposal No:	UWUCC Use Only Proposal No: ~~11-145b~~ 12-20b.
LSC Action-Date: AP-11/8/12	UWUCC Action-Date App-2/5/13 Senate Action Date: App-2/26/13

Curriculum Proposal Cover Sheet - University-Wide Undergraduate Curriculum Committee

Contact Person(s) **Jaeju Ko**	Email Address **jaeju.ko@iup.edu**
Proposing Department/Unit **Chemistry**	Phone **74596**

Check all appropriate lines and complete all information. Use a separate cover sheet for each course proposal and/or program proposal.

1. Course Proposals (check all that apply)

__X__ New Course _____ Course Prefix Change _____ Course Deletion

_____ Course Revision _____ Course Number and/or Title Change _____ Catalog Description Change

Current course prefix, number and full title: **SCI 117 Chemistry for Everyone Laboratory**

Proposed course prefix, number and full title, if changing:

2. Liberal Studies Course Designations, as appropriate

__X__ This course is also proposed as a Liberal Studies Course (please mark the appropriate categories below)

_____ Learning Skills __X__ Knowledge Area _____ Global and Multicultural Awareness _____ Writing Intensive (include W cover sheet)

_____ Liberal Studies Elective (please mark the designation(s) that applies – must meet at least one)

_____ Global Citizenship _____ Information Literacy _____ Oral Communication

_____ Quantitative Reasoning _____ Scientific Literacy _____ Technological Literacy

3. Other Designations, as appropriate

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

4. Program Proposals

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

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

Current program name:

Proposed program name, if changing:

5. Approvals	Signature	Date
Department Curriculum Committee Chair(s)		3/1/12
Department Chairperson(s)		3/1/12
College Curriculum Committee Chair		3/28/12
College Dean		3/28/12
Director of Liberal Studies (as needed)		1/31/13
Director of Honors College (as needed)		
Provost (as needed)		
Additional signature (with title) as appropriate		
UWUCC Co-Chairs	Gail S Sechrist	2/5/13

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Chemistry for Everyone Laboratory
SCI 117
Syllabus of Record

I. Catalogue Description

SCI 117 Chemistry for Everyone Laboratory 0c-2ℓ-1cr

Prerequisite: must be taken after or concurrent with SCI 107
A basic laboratory course in *chemistry* for the non-science major. Laboratory exercises are designed for the students to develop an understanding and appreciation of the process of science and of the significance of chemistry in everyday life. These laboratory exercises will demonstrate basic chemical principles and will include consumer topics, such as acids and bases, nuclear chemistry, water hardness, and food additives.

II. Course Outcomes

Objective 1: Students will use basic chemistry laboratory equipment.

Expected Student Learning Outcomes 1:
Informed Learners
Rationale:
Most of laboratory exercises and reports will require students to obtain accurate quantitative data in addition to making accurate observations. Acquiring accurate data is essential to empirical sciences.

Objective 2: Students will understand the molecular and atomic nature of matter and its interactions.

Expected Student Learning Outcomes 1 and 2:
Informed and Empowered Learners
Rationale:
All laboratory exercises will require them to relate what they are observing at the macroscopic level with what happens at the molecular/atomic level. Lab reports will require them to describe what they observe using appropriate chemical terminology, critically evaluating their own understanding.

Objective 3: Students will analyze chemical data in a quantitative manner.

Expected Student Learning Outcomes 2:
Empowered Learners
Rationale:
Lab exercises and quizzes are data-centric and will require students to analyze numerical and graphical data. The correct interpretation of data empowers students to evaluate critically a wide variety of real-world situations.

Objective 4: Students will relate chemical principles to everyday issues in health and environment.

Expected Student Learning Outcomes 3:
Responsible Learners
Rationale:
Lab exercises, quizzes, and non-textbook reading assignment will requre students to apply chemical principles to everyday issues in health and environment. Almost all lab exercise will require students to analyze or use real world samples, *e.g.*, water sample from home, mine acid drainage, hot dog meat, commercial vinegar, antacid tablets, cabbage juice, Kool-Aids, Coke, etc. In addition, students are require to practice lab safety and safe disposal of lab waste.

III. Course Outline

Each lab meeting (B through M) is composed of 2 hours of pre-lab discussion and lab exercise. Students submit individual lab reports at the end of each exercise.

A. Organizational meeting
   Lab safety rules and laboratory equipment
B. Exercise 1: Measurement and dimensional analysis
C. Exercise 2: Mass, Volume, and Density
D. Exercise 3: Paper Chromatography of Food Colorings in Kool-Aids
E. Exercise 4: Direct Observation of Physical and Chemical changes
F. Exercise 5: The Composition of a Chemical Compound
G. Exercise 6: Vinegar, baking soda, and the law of conservation of mass
H. Exercise 7: Volumetric Analysis of Vinegar
I. Exercise 8: Neutralizing Capacity of Antacid Tablets
J. Exercise 9: Water Hardness – analysis of home water sample
K. Exercise 10: Measurement of a Half-Life using a Geiger Counter
L. Exercise 11: Spectrometric Analysis of Iron in Acidic Mine Drainage
M. Exercise 12: Spectrometric Analysis of Nitrite in Luncheon Meat
N. Review session

Final Exam during final examinations week (2 hours)

IV. Evaluation Methods

1. Laboratory reports: the laboratory manual includes background information, procedure, data table, and questions for each exercise. Students perform the exercise, record their data, perform the necessary calculations, and answer the questions. These pages of the manual are submitted as a report. The twelve reports typically account for 60% of the overall grade.
2. Quizzes: each laboratory exercise is followed by an on-line quiz, which the students must complete outside class, during the week that they perform that specific exercise. The quiz questions cover the background information, calculations or the procedures of that specific exercise. The twelve quizzes typically account for 20% of the overall grade.

3. Non-textbook reading: students will submit a reflective summary of the non-textbook reading. The report should not be longer than 5 pages, exclusive of references. The report will account for 10% of the overall grade.
4. Final examination: The cumulative final exam will involve multiple choice, true/false, short answers, calculation-based problems, or essays. It will account for 10% of the overall grade.

V. Grading Scale

Grading scale: A 90-100%, B 80-89%, C 70-79%, D 60-69%, F 59% and below

VI. Undergraduate Course Attendance Policy

IUP attendance policy will be strictly followed as outlined in the current undergraduate catalog.

VII. Required Textbook

Ballas, F.; Ko, J.; Ford, J.; Long, G., *Physical Science II Laboratory with Environmental and Consumer Applications*, locally printed.

VIII. Non-textbook Reading

Distributed syllabi will include a list of 3-4 relevant nonfiction titles. Examples include:

Al Gore, *An Inconvenient Truth: the crisis of global warming*, Viking (a division of Penguin), 2007

Eric Roston, *The Carbon Age: How Life's Core Element Has Become Civilization's Greatest Threat,* Walker Publishing Company, 2009

Joe Schwarcz, *Dr. Joe's Science, Sense and Nonsense: 61 Nourishing, Healthy, Bunk-free Commentaries on the Chemistry That Affects Us All,* Anchor Canada, 2011

IX. Special Resource Requirements

Student must have a scientific calculator.

X. Bibliography

Chenier, P.J. *Survey of Industrial Chemistry,* 3rd ed.*; Springer*, New York, 2002

Hill, J. W.; McCreary, T. W.: Kolb, D. K. *Chemistry for Changing Times*, 13th ed.; Pearson, New York, 2010

Middlecamp, C. , Ed. *Chemistry in Context: Applying Chemistry to Society*; American Chemical Society, McGraw Hill, New York, 2011

Middlecamp, C. , Ed. *Laboratory Manual Chemistry in Context: Applying Chemistry to Society*; American Chemical Society, McGraw Hill, New York, 2011

Millard, J.T., *Adventures in Chemistry*, Houghton Mifflin, 2008.

vanLoon, G.W., Duffy, S.J. *Environmental Chemistry: A global perspective,* 3rd ed.*;* Oxford, USA, 2010.

Determination of Nitrite in Hot Dogs

Objective

To determine the amount of nitrite (NO_2^-) in hot dogs or luncheon meat.

Background

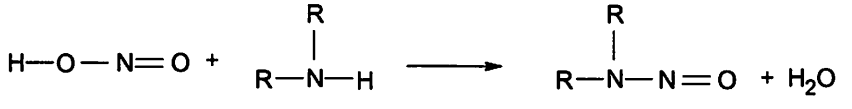
Over half of the diet of an average person in the United States consists of processed foods. Because food processing removes or destroys certain essential food substances, it is sometimes necessary to include additives in prepared food to increase its nutritional value. Other chemicals are also added to enhance color and flavor, to retard spoilage, to provide texture, to sanitize, to bleach, to ripen (or to prevent ripening), or to control moisture and dryness. There are several thousand different food additives. Earlier this semester, we identified the food additives FD&C colorings in Kool-Aids and juices. In today's exercise, we will determine the amount of one such additive, nitrite, in hot dog meat.

Nitrite (as $NaNO_2$) is added to cured meat as a spoilage inhibitor and to enhance the pink color of smoked ham, frankfurters, and bologna. It also contributes to the tangy flavor of processed meat products. Nitrites are particularly effective against *Clostridium botulinum*[1]. However, only about 10% of the amount used to keep meat pink is needed to prevent botulism. Nitrites have been investigated as possible causes of cancer of the stomach.

In the presence of hydrochloric acid (HCl) in the stomach, nitrites are converted to nitrous acid,

$$NaNO_2 + HCl \longrightarrow HNO_2 + NaCl \qquad (1)$$

which may then react with secondary amines to form nitroso compounds:



(2)

Nitrous acid A secondary amine A nitroso compound

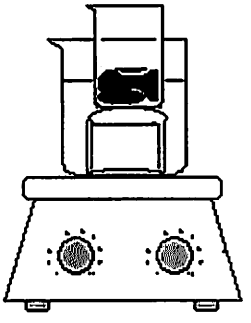
[1] The bacterium that causes botulism poisoning

These nitroso compounds are known to be carcinogenic. The rate of stomach cancer is higher in countries that use prepared meats than in the countries where people eat little or no cured meat. Sodium hypophosphite (NaH_2PO_2) is approved by the FDA as a substitute. The LD_{50}[2] for this substance is 7640 mg/kg rat, whereas the LD_{50} for $NaNO_2$ is 180 mg/kg rat.

Experimental Procedure

Your instructor will prepare the meat sample. Because nitrite can be oxidized easily when exposed to air, the meat sample must be ground fresh.

Extraction of nitrite

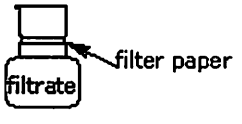


Start to heat the water bath on the hot plate (setting = 5); the water bath should contain approximately 400-450 mL of distilled water in a 600-mL beaker.

Obtain approximately 6 to 7 grams of ground hot dog (or luncheon) meat: put the "meat beaker" on the top loading balance; push "tare", then add the meat. Record the mass of the meat sample.

Add ~50 mL of distilled water to the meat beaker and heat the meat beaker in the water bath for 20 minutes at 80 – 85 °C; stir the meat sample while being heated. Proceed to the next section (Absorbance measurements) while the meat is being heated.

After the ground meat has been heated for 20 minutes, remove the beaker containing the water and meat from the water bath. Add some ice cubes to the meat beaker, stir, and nearly fill the beaker with ice to cool the mixture to below 5°C in order to solidify the grease.



Next, isolate the meat extract (containing nitrite) using the Millipore filtration apparatus. Be sure to insert a thick filter paper in the appropriate part and pour the meat/ice mixture into the upper chamber of the apparatus; obtain the extract in the lower chamber using the hand-held pump.

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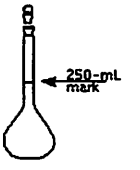
[2] LD stands for "Lethal Dose". LD_{50} is the amount of a material, given all at once, which causes the death of 50% (one half) of a group of test animals. The lower the LD_{50}, the more toxic the compound.

Add about 25-mL of distilled water to the original meat beaker; add this rinse into the upper chamber and complete the filtration.

Caution: do not unscrew the upper chamber of the filtration apparatus.

Detach the tubing from the filtration apparatus first; then, carefully pull the two chambers apart. (The chambers are not screwed together.)

Transfer the entire liquid meat extract to a 250-mL volumetric flask. Rinse the bottom chamber of the Millipore apparatus twice with 20 mL of distilled water; add these rinses to the volumetric flask. Add distilled water to the 250-mL mark of the volumetric flask and mix the contents by inverting the volumetric flask 15 times.



Discard the meat and filter paper in a special waste container provided.

Absorbance measurements for the standards

Adjustment of the Spectronic 20: the instructor will perform these steps.

Adjust the wavelength to 500 nm. After the instrument is warmed up (~ 15 minutes), set the absorbance to zero and/or infinity following the manufacturer's instructions.

Blank: Half-fill a cuvette with distilled water, add the contents of one Nitri Ver powder pillow, shake to dissolve the solids and wait 10 minutes.

Obtain approximately 25 mL each of the three standard solutions in the designated containers: 0.0250 mg nitrite, 0.0500 mg nitrite, and 0.100 mg nitrite dissolved in 250.0 mL each. Recall that your meat extract is also 250.0 mL.

Rinse (by half-filling) a cuvette twice with the 0.0250 mg nitrite solution, then half-fill the cuvette with the 0.0250 mg nitrite solution. Rinse twice and half-fill another cuvette with the 0.0500 mg solution; repeat with the 0.100 mg solution. To each of these cuvettes, add the contents of one Nitri Ver powder and shake to dissolve the solids, **wait 10 minutes**, then measure the absorbance of each standard on a Spectronic 20. Raise the sample holder cover and insert the cuvette in the sample port, aligning the etch mark on the cuvette and the mark on the sample port. Be sure to push the cuvette into the sample port completely. Close the sample port lid and read the absorbance.

Record the absorbance data and construct a calibration curve[3] using the three absorbance data: 20 small blocks in the short axis = 0.1 absorbance; 200 small

[3] The "calibration curve" should actually be a straight line, not a curve.

blocks = 0.100 mg; draw a best straight line through the three data points while minimizing the sum of the residuals.

Absorbance measurement for the meat extract

Measure the absorbance of your meat extract: rinse a cuvette with a small volume of the meat extract (in the 250-mL volumetric flask) twice, then half-fill the cuvette with the meat extract and measure the absorbance without adding the powder on the same Spec 20 you used for the standards; record the absorbance. Add the powder to the cuvette with the meat extract, shake to dissolve the powder, **wait 15 minutes**, and then measure the absorbance. Use the same Spectronic 20 you used for the standards. It is necessary to wait 15 minutes for the meat extract, because reaction rates tend to decrease with decreasing temperature.

Calculations

Determine the **mg nitrite** in the meat extract from the calibration curve you constructed using the corrected absorbance (=the absorbance with the powder minus the absorbance without the powder). Find the point that corresponds to the corrected absorbance on the absorbance-axis; using a ruler draw a horizontal line from this point to the calibration curve; from this point, draw a vertical line to the mg nitrite-axis and read the nitrite concentration (data #6).

Suppose your extract was found to have 0.0625 mg of nitrite in 4.20 grams (= 4200 mg) of meat sample. The concentration of nitrite in part per million (ppm) unit can be calculated by

$$\frac{0.0625 \text{ mg nitrite}}{4200 \text{ mg meat}} = \frac{x \text{ mg nitrite}}{1{,}000{,}000 \text{ mg meat}} \qquad (3)$$

where x in equation (3) is the nitrite concentration in ppm. Or equivalently,

$$\frac{0.0625 \text{ mg nitrite}}{4200 \text{ mg meat}} \times 10^6 = 14.9 \text{ ppm nitrite} \qquad (4)$$

Cleanup

As mentioned previously, discard the meat and filter papers in a special waste container provided. Leave the distilled water bath for the next lab section.

Wash all glassware with soap and water, rinse with tap water, then with distilled water for final rinse. Be very gentle with the cuvettes when washing them.

Clean up the table surface with a damp paper towel.

Nitrite in Hot Dogs

Name _____ **Section** _____ **Date** _____

Data and Calculations (6 points)

1) Brand of hot dog _____

2) Mass of the meat sample: _____ g = _____ mg

3) Initial time when the water bath reaches 80 °C _____

4) Time the heating ended (#3 + 20 min) _____

5) Absorbance Data[4]:

Solution	**Absorbance**
0.0250 mg nitrite in 250 mL	
0.0500 mg nitrite in 250 mL	
0.100 mg nitrite in 250 mL	
meat extract (in 250 mL) without powder	
meat extract (in 250 mL) with powder	
Corrected absorbance for meat extract (A_{with} – $A_{without}$)	

6) mg nitrite in the meat sample: _____mg Nitrite

(This is the x-value on the calibration curve that corresponds to the corrected absorbance.)

7) ppm nitrite in the meat you analyzed: _____ ppm nitrite

(Eq. 3 or 4)

[4] Attach the calibration curve to this report. Show how you obtained the mg nitrite value for the meat extract on this figure.

Questions (4 points)

1. Why is it necessary to mix the powder pillow to the standard solutions or the meat extract?

2. If the meat was not ground fresh, what effect would that have on the observed ppm nitrite? Lower or higher than the actual value? Explain.

3. Your cuvettes still had some distilled water but you forgot to rinse it with a nitrite standard before half-filling the cuvette with the standard. What effect would that have on the absorbance of the standard? Would the observed absorbance be lower or higher than the actual value or unchanged? Explain.

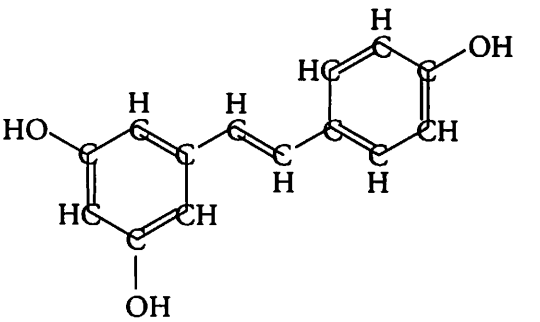
4. If you spilled some extract from the lower chamber of the filtration apparatus and did not transfer all of the extract to the volumetric flask, what effect would that have on the observed ppm nitrite? Lower or higher than the actual value? Explain.

SCI 117 Chemistry for Everyone Laboratory – final examination

Show your work in a clear and logical manner. No points will be given to illegible work.

1. (2 pts) In 1992, Renaud and de Lorgeril published a paper, "Wine, Alcohol, Platelets, and the French Paradox for Coronary Heart Disease" in Lancet, a medical journal.

   The authors claimed that while the traditional French diet is rich in animal fats, the French rate of heart attack is about 40% of that of Americans. Renaud and de Lorgeril attributed this decreased risk of heart attack to the French passion for red wine. Much of the protective effect of red wine has since been attributed to the molecule *resveratrol* (shown right), found in grape canes, leaves, and skin.



Resveratrol

What is the molecular (chemical) formula of resveratrol?

What is the *molar mass* of resveratrol? (Your answer must include a unit)

How many **moles** of resveratrol are in 2.5 mg resveratrol?
1 mg = 1×10^{-3} g

How many resveratrol molecules are there in 2.5 mg of resveratrol?

Less than a billion or more than a billion molecules?

2. (2 pts) What is the concentration of H^+ (in mol/L) in a mine drainage whose pH is equal to 3.0?

Note: $pH = -\log[H^+]$

Which is more acidic, a battery acid (pH=0.5) or the mine drainage above?

3. (2 pts) Figure 1 and Figure 2 below represent the initial and final liquid level in a 25-mL buret. Read the initial and the final volume and determine the volume delivered by the buret.

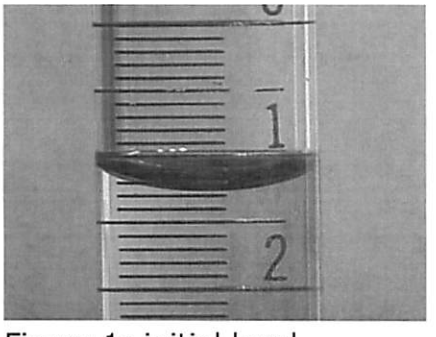


Figure 1: initial level

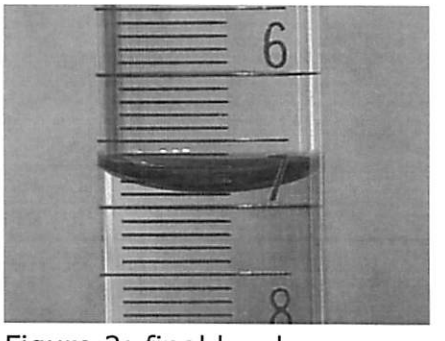


Figure 2: final level

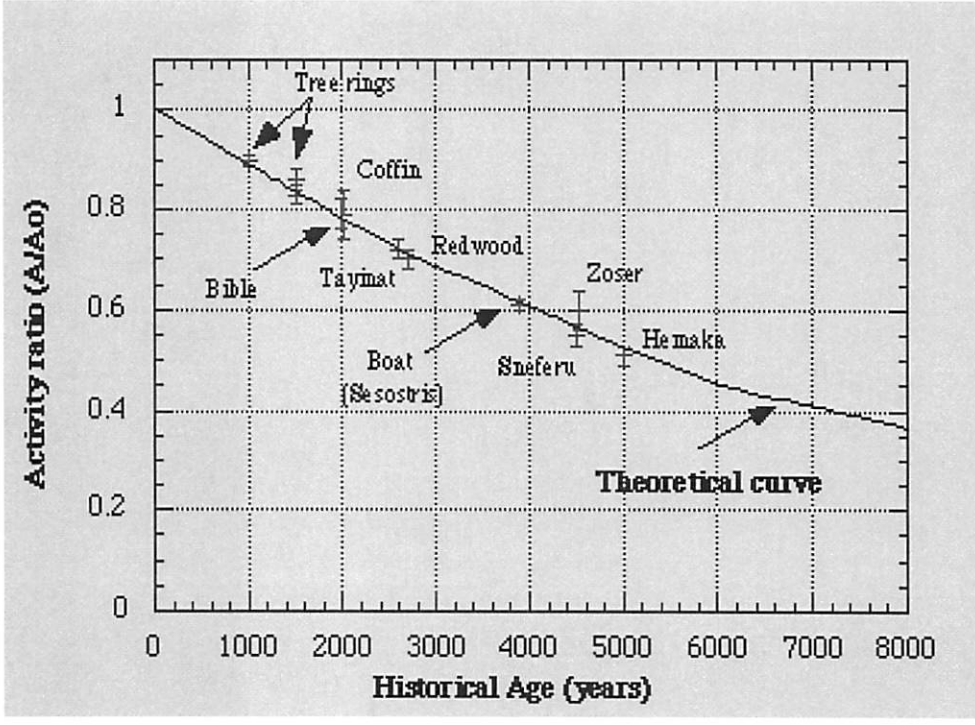
Initial reading _____

Final reading _____

The volume delivered _____ mL

4. (2 pts) In 1949, Arnold and Libby published their paper "*Age determinations by radiocarbon content: Checks with samples of known age*" in the journal *Science*. In this paper they presented the first results of the Carbon-14 method, including the "Curve of Knowns" in which radiocarbon activities in the artifacts were compared with the known historical dates. Willard F. Libby received the Nobel Prize in Chemistry in 1960.

A slightly modified version of the Curve of Knowns from the original 1949 paper is shown below.



According to the "theoretical curve" in this figure, what is the half-life of carbon-14?

Show your work on the graph and include a <u>unit</u> in your answer.

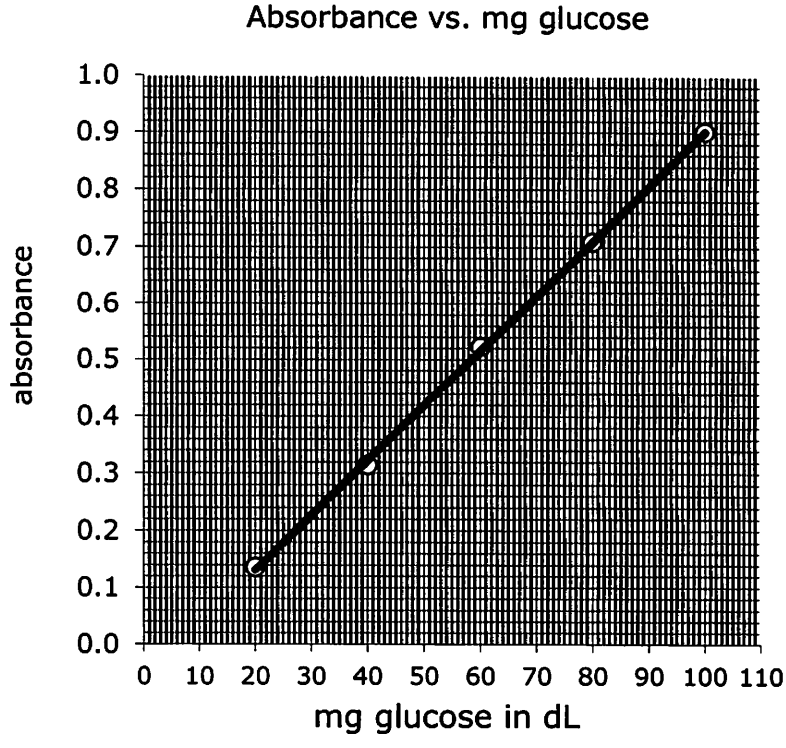
1 deciliter = 1 dL = 100 mL. The concentration of blood glucose level is often measured in milligrams per deciliter (mg/dL).

5. (2 pts) The glucose concentration in a honey sample was determined by a spectrometric analysis similar to the hot dog experiment. First, each of the five standard glucose solutions was prepared by dissolving a known mass of glucose in a 1-dL volumetric flask (see Table below). Each standard was treated with a special reagent to develop a reddish-brown color and absorb light at 540 nm. The calibration curve (shown below) was constructed from the absorbance data of the five standard solutions.

The honey sample was similarly prepared by dissolving <u>75.0 mg of honey</u> in a 1-dL volumetric flask and treated with the same special reagent. The absorbance for the honey solution was 0.426.

Absorbance data for the standard solutions

Mass of Glucose in one dL	Absorbance
20.0 mg	0.135
40.0 mg	0.314
60.0 mg	0.522
80.0 mg	0.709
100.0 mg	0.901



Show your work on the graph.

What is the mass of glucose in the honey sample? _____ mg

What % of the honey sample is glucose? _____%

(show work.)

6. (1 pt) Which of the following acid-base indicators turns pink in basic (alkaline) solutions?

    a) Bromcresol green
    b) Phenolphthalein
    c) Cabbage juice
    d) Grape juice

7. (1 pt) Which of the following devices will allow you to deliver a ten mL liquid sample most precisely?

    a) A 100-mL graduated cylinder that can be read to the nearest 0.1 mL
    b) A beaker with a 10-mL marking on it.
    c) A buret that can be read to the nearest 0.01 mL

8. (1 pt) PPG is one of the major producers of sodium hydroxide (lye). What is the chemical formula of this highly caustic substance?

    a) NaCl b) $NaCl_2$ c) NaOH d) $Na(OH)_2$

9. (1 pt) Two different samples are chromatographed exactly as we did in exercise 3. The chromatogram shows a single spot for each sample. The spots have the same color and the same R_f value. We can say

    a) that the two samples might contain the same substance.
    b) that the two samples must contain the same substance.
    c) that the two samples cannot contain the same substance.
    d) nothing about the substances in the samples.

10. (1 pt) We now know that when we added a few drops of aqueous silver nitrate on the penny in exercise 4, we created a new substance. The gray material that formed on the surface of the penny was _____.

    a) copper metal
    b) silver metal
    c) some other silver containing compound
    d) some copper containing compound
    e) some other nitrate containing compound

Answers to Liberal Studies Questions

1. If this is a multiple-section, multiple-instructor course, there should be a basic equivalency (though not necessarily uniformity) among the sections in such things as objectives, content, assignments and evaluation.

The Department uses several strategies to provide basic equivalency across multiple sections of SCI 117 laboratory. First, a single faculty member serves as course coordinator and has responsibility for selecting the laboratory exercises and supervising the preparation of laboratory materials. While sensitive to the sanctity of academic freedom, the coordinator also encourages faculty to adhere closely to the syllabus of record. Faculty teaching the lab are also encouraged to comment on the exercises and to help create new exercises, as well as to contribute additional quiz questions.

2. Liberal Studies courses must include the perspectives and contributions of ethnic and racial minorities and of women whenever appropriate to the subject matter.

The nature of the laboratory environment does not allow inclusion of such information, beyond appropriate mention of contributions in the background information provided in the lab manual. Execution of the exercises requires virtually all time allotted.

3. Liberal Studies courses require the reading and use by students of at least one non-textbook work of fiction or non-fiction or a collection of related articles.

The students will be required to read a non-fiction popular press book covering one or more aspects of how science or technology impact society. Examples of such books include: *Dr. Joe's Science, Sense and Nonsense: 61 Nourishing, Healthy, Bunk-free Commentaries on the Chemistry That Affects Us All, The Carbon Age: How Life's Core Element Has Become Civilization's Greatest Threat, and An Inconvenient Truth: the crisis of global warming.* These books will broaden the content of the course.

4. It should introduce the discipline to students rather than introduce students into the discipline. If this is such an introductory course, how is it different from what is provided for beginning majors?

This laboratory course is different from that provided to either allied health majors or science majors. The content of this course is approximately evenly split between illustrating the fundamental concepts of chemistry and performing simple measurements relevant to environmental and consumer issues. There is no emphasis on laboratory technique, beyond the minimum necessary to perform the exercises – unlike the majors' course. The concepts illustrated are the most fundamental – the differences between chemical and physical changes, conservation of mass, and constant composition – to modern chemical theory, unlike the laboratory programs for other students, which assume such elementary concepts are already understood.

Course Analysis Questionnaire

Section A: Details of the Course

A1 How does this course fit into the programs of the department? For what students is the course designed? (majors, students in other majors, liberal studies). Explain why this content cannot be incorporated into an existing course.

This course is intended mostly for students enrolled in the Colleges of Fine Arts, College of Business and Information Technology and College of Humanities and Social Sciences.

The proposed course together with SCI 107 (if approved) will replace SCI 106. The lab portion of SCI 106 is proposed as SCI 117 and the lecture portion as SCI 107. This separation will offer students increased flexibility in fulfilling the new LS requirements.

A2 Does this course require changes in the content of existing courses or requirements for a program? If catalog descriptions of other courses or department programs must be changed as a result of the adoption of this course, please submit as separate proposals all other changes in courses and/or program requirements.

YES. If SCI 107 and SCI 117 are approved, SCI 106 will be deleted.

A3 Has this course ever been offered at IUP on a trial basis (e.g. as a special topic) If so, explain the details of the offering (semester/year and number of students).

No, SCI 117 was not offered on a trial basis. However, SCI 106 has been taught at IUP for two decades.

A4 Is this course to be a dual-level course? If so, please note that the graduate approval occurs after the undergraduate.

No, this course is not dual-level.

A5 If this course may be taken for variable credit, what criteria will be used to relate the credits to the learning experience of each student? Who will make this determination and by what procedures?

This course is not taken for variable credit.

A6 Do other higher education institutions currently offer this course? If so, please list examples (institution, course title).

Similar course is taught at Slippery Rock University (CHEM 110 Contemporary Chemistry Laboratory) and is the lab component of Cal State Long Beach's CHEM 100 Chemistry and Today's World.

A7 Is the content, or are the skills, of the proposed course recommended or required by a professional society, accrediting authority, law or other external agency? If so, please provide documentation.

No, this course is not required by a professional society, accrediting authority, law or other external agency.

Section B: Interdisciplinary Implications

B1 Will this course be taught by instructors from more than one department? If so, explain the teaching plan, its rationale, and how the team will adhere to the syllabus of record.

No, this course is taught by instructor(s) from the Chemistry Department.

B2 What is the relationship between the content of this course and the content of courses offered by other departments? Summarize your discussions (with other departments) concerning the proposed changes and indicate how any conflicts have been resolved. Please attach relevant memoranda from these departments that clarify their attitudes toward the proposed change(s).

There is no significant overlap between this course and courses offered by other departments.

B3 Will this course be cross-listed with other departments? If so, please summarize the department representatives' discussions concerning the course and indicate how consistency will be maintained across departments.

This course will not be cross-listed.

Section C: Implementation

C1 Are faculty resources adequate? If you are not requesting or have not been authorized to hire additional faculty, demonstrate how this course will fit into the schedule(s) of current faculty. What will be taught less frequently or in fewer sections to make this possible? Please specify how preparation and equated workload will be assigned for this course.

Faculty resources are adequate to teach this course.

C2 What other resources will be needed to teach this course and how adequate are the current resources? If not adequate, what plans exist for achieving adequacy? Reply in terms of the following:

None – IUP's current resources are sufficient to teach this course.

C3 Are any of the resources for this course funded by a grant? If so, what provisions have been made to continue support for this course once the grant has expired? (Attach letters of support from Dean, Provost, etc.)

This course is not grant-funded.

C4 How frequently do you expect this course to be offered? Is this course particularly designed for or restricted to certain seasonal semesters?

This course will be offered every semester and during the summer.

C5 How many sections of this course do you anticipate offering in any single semester?

Six to seven laboratory sections will be offered each semester.

C6 How many students do you plan to accommodate in a section of this course? What is the justification for this planned number of students?

Laboratory sections can accommodate 24 students per section.

C7 Does any professional society recommend enrollment limits or parameters for a course of this nature? If they do, please quote from the appropriate documents.

There are no professional society limitations on enrollment.

C8 If this course is a distance education course, see the Implementation of Distance Education Agreement and the Undergraduate Distance Education Review Form in Appendix D and respond to the questions listed.

Not applicable.

Section D: Miscellaneous

Include any additional information valuable to those reviewing this new course proposal.

This course will be offered as a Liberal Studies Natural Science Laboratory Course. The proposed course represents an updated version of the laboratory portion of SCI 106 Physical Science II.