**PURDUE UNIVERSITY**
**REQUEST FOR ADDITION, EXPIRATION, OR REVISION OF AN UNDERGRADUATE COURSE**
(10000-40000 LEVEL)

DEPARTMENT: Chemistry  
EFFECTIVE SESSION: 2016-10

**INSTRUCTIONS:** Please check the items below which describe the purpose of this request.

1. New course with supporting documents
2. Add existing course offered at another campus
3. Expiration of a course
4. Change in course number
5. Change in course title
6. Change in course credit/grade type
7. Change in course attributes (department head signature only)
8. Change in instructional hours
9. Change in course description
10. Change in course prerequisites
11. Change in semesters offered (department head signature only)
12. Transfer from one department to another

**PROPOSED:**
- Subject Abbreviation: CHM
- Course Number: 29001
- Long Title: Selected Topics in Chemistry Labs for Lower Division Students
- Short Title: Selected Topics in CHM Labs

**EXISTING:**
- Subject Abbreviation
- Course Number
- Abbreviated title will be entered by the Office of the Registrar if omitted. (60 CHARACTERS ONLY)

**TERMS OFFERED:**
- Check All That Apply:
  - [x] Fall
  - [x] Spring
  - [x] Summer

**CAMPUS(ES) INVOLVED:**
- Calumet
- Cont Ed
- Ft Wayne
- Tech Statewide
- Indianapolis
- N. Central
- W. Lafayette

**CREDIT TYPE**
1. Fixed Credit: Cr. Hrs. 
2. Variable Credit Range: Minimum Cr. Hrs. (Check One)  
   - [x] 1  
   - [ ] 2  
   - [ ] 3  
   - [ ] 4  
   - [ ] 5  
   - [ ] 6  
   - [ ] 7  
   - [ ] 8  
   - [ ] 9  
   - [ ] 10  
3. Equivalent Credit: Yes [x] No 

**COURSE ATTRIBUTES:** Check All That Apply
1. Pass/No Pass Only
2. Satisfactory/Unsatisfactory Only
3. Repeatable
4. Credit by Examination
5. Fees: [x] Coop [ ] Lab [ ] Rate Request
6. Registration Approval Type
   - [x] Department
   - [ ] Instructor
7. Variable Title
8. Honors
9. Full Time Privilege
10. Off Campus Experience
11. Include comment to explain fee

**Schedule Type**
- Lecture: 
- Recitation: 
- Presentation: 
- Laboratory: 
- Lab Prep: 
- Studio: 
- Distance: 
- Clinic: 
- Experiential: 
- Research: 
- Ind. Study: 
- Pract/Observ: 

**Minutes Per Week**

**Meeting Per Week**

**Weeks Offered**

**% of Credit Allocated**

**FOR EXAMPLE:**  
For 1 credit  
A variety

**COURSE DESCRIPTION (INCLUDE REQUISITES/RESTRICTIONS):**  
P: consent of instructor.

**COURSE LEARNING OUTCOMES:**  
Apply basic observational, quantitative, or technological methods to gather data and generate evidence-based conclusions.

**Calumet Department Head**  
[Signature]  
1/8/15

**Calumet School Dean**  
[Signature]  
1/27/15

**Fort Wayne Department Head**  
[Signature]  
[Date]

**Fort Wayne School Dean**  
[Signature]  
[Date]

**Indianapolis Department Head**  
[Signature]  
[Date]

**Indianapolis School Dean**  
[Signature]  
[Date]

**North Central Faculty Senate Chair**  
[Signature]  
[Date]

**Vice Chancellor for Academic Affairs**  
[Signature]  
[Date]

**West Lafayette Department Head**  
[Signature]  
[Date]

**West Lafayette College/School Dean**  
[Signature]  
[Date]

**West Lafayette Registrar**  
[Signature]  
[Date]

Office of the Registrar
MEMORANDUM

TO: COAS Curriculum Committee & Dean Blakemore

FROM: Ronald Friedman, Chemistry Chair

DATE: January 8, 2015

RE: New Course Creation

Please find enclosed the Form 40 and accompanying documentation for the creation of the new course, CHM 29001. Such a course is necessary because occasionally a student will transfer to IPFW credits from the lecture part of a required chemistry class, but without the lab component. CHM 29001 is then a mechanism by which they can enroll in the lab only portion of the course, which combined with their transfer credit allows them to satisfy the chemistry requirement. Since CHM 29001 is specially created for lab components, the university, therefore, has a mechanism for charging students the accompanying lab fee.

Thank you for attention to this matter.
Syllabus

I. **Staff.** The instructor in charge of this section is _________________________________

   Office: _______________     Office hours: ___________________________________________________________________

   Phone: _______________      Email: ________________________________________

II. **Study Materials.**


   B. Student Lab Notebook (50 or 100 carbonless duplicate sets, perforated copy), Hayden-McNeil Specialty Products

   C. Safety Goggles. You must have approved safety goggles in order to work in the lab. Approved safety goggles are available at the bookstore. Goggles obtained elsewhere may not be acceptable.

   D. All graphs submitted as part of a laboratory report **must** be generated using a computer. Spreadsheet and graphing software is available in the computer laboratories on campus. **It is the responsibility of each student to learn and utilize the available software.**

III. **About the Laboratory.** Chemistry is an experimental science and the laboratory is a vital part of this course. The eventual value of this course to you – as well as your grade in it – will depend significantly on your attitude towards your laboratory work. Several key ingredients important to the successful completion of a laboratory experiment are discussed below.

   A. ** Advance Preparation**

      1. The better your understanding of each experiment before you enter the lab, the more you will get out of performing that experiment. **Accordingly, you must study the laboratory manual and prepare your notebook before you come to lab.**

      2. As part of your preparation for lab each week, you will be required to write the experimental procedure and data section into your notebook **before** you come to lab. If the procedure is not in your notebook when lab starts, you will not be permitted to perform the lab and you will not be allowed to make up the lab.

      3. See section IV for further information regarding the notebook format.

   B. **Technique.** An important part of experimentation in any area is knowing how to carry out the various procedures that are required in a safe and efficient manner. One of your

   C. **Recording Procedures and Data.** It is useless to perform an experiment and subsequently lose the resultant data or record data for which experimental conditions are not also carefully recorded. **Thus, the requirement that you keep an approve laboratory notebook.**
1. **Prior to the lab period,** you must record all relevant procedures in your notebook in sufficient detail that someone following your notebook with no other preparation can carry out the procedure correctly and efficiently.

2. **During the actual lab period,** you are expected to record all data in your notebook as they are collected, along with experimental conditions. Writing data to loose sheets of paper for later entry in the notebook is unacceptable. For a more detailed description of the required format for the lab notebook, see section IV.

D. **Objectivity.** Scientific experiments and the results of those experiments should be approached and reported objectively. There are few areas of human activity in which honesty is more important than in scientific inquiry.

   1. Data must be recorded in your notebook as they are collected. Many scientists make it a habit to re-read an instrument after a datum has been recorded, comparing the “new” datum to the one that was just recorded. In this way, many gross errors may be avoided.

   2. Occasionally, there may be times when, in spite of your best efforts or for reasons beyond your control, things will not go well for you in the lab. If this happens, see your instructor immediately for guidance on how to proceed. If you have given a good effort on the experiment, then the least you should do is prepare a report including your experimental data, however bad you may think them to be.

   3. **NEVER, EVER “borrow” results from others!**

E. **Safety.** When you check into lab, your laboratory instructor will discuss the Chemistry Department Safety Regulations. You will then be required to read and sign a copy to indicate that you will agree to abide by these regulations.

IV. **Format for the Laboratory Notebook.** Your laboratory notebook should conform to the protocols expected in most science laboratories. Your entries should be timely, unambiguous, complete, permanent and dated.

   A. **All pages must be retained in their original places, even those which contain errors.** The first page of the notebook is reserved for a table of contents listing the titles of all experiments performed and the page on which each begins. These entries should be made when you prepare for lab each week.

   B. **Permanent ink must be used for every entry you make.** Each data entry must be made as soon as the information is available. This implies that you carry your notebook with you to instruments such as balances and barometers, etc. **Errors should be corrected by placing a single line through the erroneous datum.** Wite-out®, Liquid Paper® or other correction fluids are not acceptable, nor is scratching out errors.

   C. Your notebook should carry enough information that it can be returned if it is ever lost. **Your name and the course number must be written on the table of contents page along with your address or the Department of Chemistry address if you prefer.**
D. The format of the entries for each experiment should be as follows:

1. **Title Section** – Title of Experiment, Date, and Number of Experiment (from the lab manual) along with your name and, if applicable, lab partner's name. Your instructor may want you to include your section number and drawer number as well.

2. Procedure - Here you will record the experimental procedure. *Copying the procedure word-for-word is not acceptable.* You must paraphrase the written procedure or write a series of bullet points or flow chart in such a way that you or someone else following your notebook with no other preparation can carry out the procedure correctly and efficiently. Try to restrict the procedure to a page or two. The carbon copies will be collected by your instructor prior to lab. **If the procedure is not in your notebook when lab starts, you will not be permitted to perform the lab and you will not be allowed to make up the lab.** An example of the procedure page is given at the end of this syllabus.

3. **Data Section** -- *The data section will begin on a new page and its format should be the same as that of the data sheet from the lab manual.* This section must be initialed by the instructor before you leave the laboratory. Also, you must turn in the copy of the data sheet before leaving. An example of the data section is given at the end of this syllabus.

4. **Calculations** -- The calculation section will also begin on a new page. Show all calculations so that in event of erroneous results, it can readily be determined whether you have an experimental error or arithmetic error. A copy of the calculations must be turned in with your report sheet.

5. **Conclusion** -- A concluding section summarizing the results of the lab. You should include in this section any possible sources of error which might impact your results, and where quantitative error analysis is possible, it should be included here.

V. **Laboratory Attendance and Policies.** The laboratory is a vital part of the course. Students will have one laboratory period (2 hours, 50 minutes) to complete each laboratory assignment.

A. **Students who do not finish the lab in the allotted time will not be allowed any additional time, either in their own or any other lab section.**

B. **Students arriving after the completion of the laboratory instructor's pre-lab discussion will not be allowed to do the lab.**

C. If you miss a lab for any reason, you must notify your instructor immediately.

   1. A missed lab without a valid excuse such as hospitalization, death in the family, sickness (with an excuse from the doctor and/or medical center), or car accident, will result in an unexcused absence and grade of zero for that lab and quiz. Traveling, unless on official IPFW business, is not considered a valid excuse in this course.

   2. **Detailed reasons (with supporting documentation) for absences from lab must be presented to your instructor immediately upon your return.**
3. Because all labs are full, there are no make-up labs. You will be allowed a maximum of one excused and one unexcused absence. To obtain an excuse for an absence, you must provide supporting documentation to your lab instructor in a timely manner.

4. Except for dry labs, all students must have goggles to work in the lab. Failure to bring one's goggles or to be dressed appropriately will constitute an unexcused absence.

5. Any student failing to complete (i.e. performing the lab and submitting a report) three or more labs will receive a grade of F for the course.

VI. Lab Quizzes. A lab quiz for each lab will be given at the beginning of the lab. No make-up quizzes will be given. Students arriving late will not be given any extra time. This quiz may cover any aspect of the theory, procedure or data analysis involved in the lab. All lab quizzes will be worth 5 points. You may find the "Advance Study Assignment" (included with all labs except the first) useful in preparing for the quiz each week. These "assignments" will never be collected.

VII. Lab Reports. Lab reports are simply the completely filled out page(s) from the lab manual labeled "Report Sheet," along with copies of all relevant calculations. These are due at the beginning of the lab period following the one in which the experiment was performed. All lab reports are worth 15 points. Lab reports turned in up to one week late will be subject to a penalty of 2 points per day or fraction thereof. Lab reports more than one week late will not be accepted.

VIII. Last Day to Drop. The last day to drop the course is Friday, November 1st. It is University policy that any student who stops attending a class without officially withdrawing will receive a grade of "F" in the class.

IX. A typical day in the lab.

A. Assemble outside the lab and await your instructor.

B. Be prepared to submit the procedure for the lab that you are about to perform as well as the lab report for the lab you performed in the previous lab period.

C. Take the quiz for that day's lab.

D. Listen to the pre-lab lecture, taking notes as necessary, especially when changes in the procedure are announced.

E. Perform the procedure, recording all data in your notebook. Unless otherwise instructed, all labs will be performed individually.

F. When all the required data has been collected and recorded, sign and date the data page(s). Have your instructor check your data and initial the data page(s). Tear out the copy of the data page and submit it as directed by your instructor.
### Laboratory Schedule

<table>
<thead>
<tr>
<th>Dates</th>
<th>Assignment</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aug 26-29</td>
<td>Check-in/Assessment Exam&lt;sup&gt;2,3&lt;/sup&gt;</td>
<td></td>
</tr>
<tr>
<td>Sept 2-5</td>
<td>Measurement and Data Analysis&lt;sup&gt;2,3&lt;/sup&gt;</td>
<td>Exp 1</td>
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<tr>
<td>Sept 9-12</td>
<td>Intensive Properties I: Density</td>
<td>Exp 2</td>
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<tr>
<td>Sept 16-19</td>
<td>Determination of a Chemical Formula</td>
<td>Exp 5</td>
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<td>Sept 23-26</td>
<td>Identification of a Compound By Mass Relationships</td>
<td>Exp 8</td>
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<td>Sept 30-Oct 3</td>
<td>Separation and Identification of Ions Using Chemical and Physical Properties</td>
<td>Exp 4</td>
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<td>Oct 7-10</td>
<td>Reaction Stoichiometry: The Mole Ratio Concept</td>
<td>Exp 7</td>
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<td>Oct 14-17</td>
<td><strong>Labs will not meet this week</strong></td>
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<tr>
<td>Oct 21-24</td>
<td>Standardization of Sodium Hydroxide and the Determination of the Molar Mass Of an Acid</td>
<td>Exp 9</td>
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<td>Nov 4-7</td>
<td>The Emission Spectrum of Hydrogen&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Exp 11</td>
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<tr>
<td>Nov 11-14</td>
<td>The Alkaline Earths and the Halogens – Two Families in the Periodic Table</td>
<td>Exp 12</td>
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<tr>
<td>Nov 18-21</td>
<td><strong>Labs will not meet this week</strong></td>
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<tr>
<td>Dec 2-5</td>
<td>Molecular Geometry: Lewis Structures and the Valence Shell Electron Pair Repulsion Model&lt;sup&gt;2,3&lt;/sup&gt;</td>
<td>Exp 14</td>
</tr>
<tr>
<td>Dec 9-12</td>
<td>Determination of the Gas Constant, R, and the Purity of KClO₄ and Check-Out</td>
<td>Exp 10</td>
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2. Dry labs. Goggles are not required.

3. Notebooks are not required.
Density by Direct Measurement

1. Obtain a small bottle and cap and metal sample. (If the bottle is not dry, add a little acetone, cap the bottle and shake it.) Pour the acetone into the waste bottle provided. Allow excess acetone to evaporate. Dry the outside of the bottle. Weigh the bottle and cap, recording the mass.

2. Add deionized water to completely fill the bottle. Cap the bottle and check to be certain there are no air bubbles. If there are bubbles, repeat this step. Dry the outside of the bottle and weigh it again.

3. Measure the temperature of the water to the nearest 0.1°F. Obtain the density of the water at this temperature in Appendix C. Use the mass and density to calculate the volume of water which is also the volume of the bottle.

4. Dry the bottle again and add metal sample to the bottle until it is at least half full. Weigh the bottle, cap, and metal together.

5. Add water to the metal in the bottle until the bottle is completely filled. Replace the cap and check for air bubbles by rolling the metal sample in the bottle and inverting it.

6. Dry the outside of the bottle and weigh it along with its contents.

7. Measure the temperature of the water to the nearest 0.1°F. Obtain the density of water as before and calculate the volume of water now in the bottle.

Graphical Determination of Density

1. Dry the metal used in part I.

2. Place a #2 rubber stopper in the bottom of a 100 mL graduate cylinder. Add deionized water to near the 50 mL mark.

3. Record the volume to the nearest 0.1 mL in the data table.

4. Dry the exterior of the cylinder and weigh it. Record the mass.

5. Divide the metal sample into 5 roughly equal portions.

6. Add the first group of metal pieces to the graduated cylinder. Avoid splashing the water.

7. Record the new volume and mass.

8. Repeat until all 5 portions of metal have been added. (Do not let the metal break the surface of the water.)
Data Section

Unknown number

Identity of metal (if provided)

Mass of dry, empty bottle and cap

Mass of bottle, water and cap

Temperature of water

Density of water at T

Mass of bottle and metal

Mass of bottle, metal and water

Temperature of water

Density of water at T

<table>
<thead>
<tr>
<th>Sample</th>
<th>total volume of water and metal (mL)</th>
<th>mass of cylinder and contents (g)</th>
<th>total volume of metal (mL)</th>
<th>total mass of metal (g)</th>
<th>calculated density (g/mL)</th>
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<tbody>
<tr>
<td>0</td>
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<td>0.0 mL</td>
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Signature: Don Mastodon  Date: 9/10/13

Note: Insert back cover under copy sheet before writing