



CAMPBELLVILLE UNIVERSITY

COURSE SYLLABUS

PLEASE TYPE.

DATE 19 December 2016

ACADEMIC UNIT Natural Science Division FACULTY Elizabeth K. Sutton

Discipline	Course # Section	Title of Course	Credit Hours	Cross Reference (if applicable)
CHE	454-91	Physical Chemistry II Lab	1	n/a

TEXTBOOK Required Not Required

Author Halpern, Arthur Title Experimental Physical Chemistry, 3rd ed

Publisher W.H. Freeman Date of Publication 2006

WORKBOOK Required Not Required

Author _____ Title _____

Publisher _____ Date of Publication _____

PLEASE ANSWER THE FOLLOWING QUESTIONS ON A SEPARATE SHEET OF PAPER AND ATTACH TO THIS FORM.

- DESCRIPTION OF COURSE: Develop a brief description of the course as it will appear in the Catalog.
- STUDENT LEARNING OBJECTIVES: List the student learning objectives for the course. Please relate these objectives to the mission and goals of the University and the Academic Unit. For general education courses, please indicate which student learning objectives address general education goals and the intended method of assessment. A minimum of four of the seven general education goals must be included.

Example: Students will demonstrate their ability to compare and contrast two types of basket weaving. (Goal: Oral and Written Communication; Evidence: research paper and class presentation)
- COURSE OUTLINE: Outline the topics/units that are to be taught.
- EVALUATION: How do you plan to determine the grade in the course? Please include grading scale.
- REQUIREMENTS:
 - Examinations: State when tests are to be administered, including unit, mid-term, and final examinations.
 - Reports: How many, length required, and what type (Oral, term and/or research, book critiques).
 - Supplemental reading assignments or outside work required.
 - Supplemental instruction aids: Audio visual aids, field trips, guest speakers, etc.
- BOOKLIST

DEAN

Date Copy Received _____

VICE PRESIDENT FOR ACADEMIC AFFAIRS

Date Copy Received _____

- I. **TITLE:** CHE 454 Physical Chemistry II Laboratory, one credit hour.
- II. **DESCRIPTION OF COURSE:** A laboratory course illustrating the theoretical principles discussed in CHE 452. One 3 hour laboratory period per week is required.
- III. **COURSE OBJECTIVES**
- A. **General Education Curriculum Objectives (GECO):** (numbered to correspond to the listing in the University catalog)
2. Critical Thinking: Students will demonstrate the ability to reflect on theories and issues in a systematic fashion.
 4. Ethics: Students will demonstrate an understanding of Christian values and ethical standards in order to make mature and informed decisions concerning moral issues.
 5. Oral and Written Communication: Students will demonstrate the ability to express ideas, beliefs, and information in an organized, precise, and persuasive manner.
 6. Quantitative Literacy: Students will demonstrate the ability to understand and utilize mathematical and/or logical relationships to analyze data, to construct and assess arguments, and to make sound judgments in quantitative situations that arise in daily life.
 7. Social Responsibility and Citizenship: Students will demonstrate an understanding of personal and social responsibility in a changing global environment so that students can make contributions to their respective discipline and to society as a whole.
- B. **Student Learning Outcomes (SLO):** Students will demonstrate their laboratory skills and problem solving ability in this course. (numbered to correspond to the pertinent General Education Curriculum Objective [GECO])
1. Students will specifically demonstrate laboratory and safety techniques that are related to quantitative analysis of solution chemistry and chemical samples. (GECO 6; Evidence: lab reports)
 2. Students will develop skills to critically analyze the validity of experimental data.(GECO 6; Evidence: lab reports)
 3. When possible, real life samples will be used to expose students to practical, real-world problem solving of contemporary, historical, technological, and societal issues. (GECO 2, 6, 7; Evidence: lab reports)
 4. Students should be able to read, understand, and apply scientific information through thinking more critically, discussing more meaningfully, arguing more persuasively, and writing more effectively. (GECO 2, 5; Evidence: lab reports)
 5. Students will follow ethical practices when conducting research, writing reports, using sources and when working with others. (GECO 4; Evidence: lab reports)
 6. Students will develop an awareness of how a basic understanding of chemistry, the proper application of that knowledge, and the interaction between chemistry and other fields of study and careers is important to personal and social issues. (GECO 4, 6, 7; Evidence: lab reports)
- C. **Program Learning Outcomes (PLO):** (numbered to correspond to the program learning outcomes listed in the program assessment document)
2. The student will be able to perform qualitative/quantitative chemical analyses/syntheses through the use of the appropriate laboratory techniques/equipment, experimental design, data acquisition, interpretation of data, and relevant instrumentation.
 4. The student will be able to articulate chemical information/data/ideas clearly and effectively in speech and in writing in an acceptable presentation format.
 6. The student will demonstrate critical thinking skills in chemistry: interpretation, evaluation, explanation, and scientific inquiry; how to ask appropriate questions, gather relevant information effectively and creatively, and reason logically from this information to make reliable conclusions.

D. Course Specific Objectives(CSO)

(Numbered to correspond to the pertinent Program Learning Outcome [PLO])

1. The student will learn the practical laboratory techniques involved in measuring the properties of physicochemical systems; gas law relations free energy and equilibria; electrochemical processes; and solutions. (PLO 2; Evidence: lab reports)
2. The student will learn to evaluate the results of your experiments and to present them in a proper scientific format. This will include demonstrating good technical writing skill and appreciation of inherent errors in laboratory experiments. (PLO 4,6; Evidence: lab reports)
3. The student will be able to determine the heat capacity ratio of gases. (PLO 2, 4,6; Evidence: lab reports)
4. The student will be able to measure enthalpies of combustion by use of a bomb calorimeter. (PLO 2, 4,6; Evidence: lab reports)
5. The student will be able to measure enthalpies of reaction in solution by use of a solution calorimeter. (PLO 2, 4,6; Evidence: lab reports)
6. The student will be able to determine the molecular weight of an unknown solute by measuring the freezing point depression of a solution containing the solute. (PLO 2, 4,6; Evidence: lab reports)
7. The student will be able to determine the partial molar volumes of a solution by measuring the density as a function of concentration. (PLO 2, 4,6; Evidence: lab reports)
8. The student will be able to use statistical methods to treat error and use least squares methods to analyze data. (PLO 2, 4,6; Evidence: lab reports)

IV. COURSE OUTLINE

- A. Techniques
- B. Experiments
 1. Electrochemistry
 2. Kinetics
 3. Spectroscopy
 4. Surface Effects

V. EVALUATION

The student's final grade will be based on the performance of five to ten laboratory experiments and written reports. Laboratory reports: 75% and lab notebook gradings: 25%. A twelve-point scale will be used to compute the final grade. 100-88% = A; 87-76% =B; 75-64% = C; 63-52% = D and 51-0% = F.

Dates to Remember:			
M. L. King, Jr Day-No Class	Jan 16	First Bi-term ends	Mar 11
Evening classes begin	Jan 17	Spring Break-No Classes	Mar 13-17
Day classes begin	Jan 18	Second Bi-term begins	Mar 20
Last day add/register for Spring term	Jan 20	Easter Holiday-No Classes	Apr 14-17
Last day to drop 1 st Bi-term class with W	Feb 24	Last day to drop a semester class with W	Apr 13
Midterm Week	Mar 6-10	Finals Week	May 8-12

VI. COURSE REQUIREMENTS:

- A. **Attendance:** Each student is expected to attend at each class meeting. The University Undergraduate Student Attendance Policy will be followed in this course. This class meets once a week; therefore, according to the policy only two (2) absences are allowed. If a student is more than 25 minutes late (by my watch), then that student will be counted as absent.
- B. **Numbers to Remember:**
 1. **Campus Security Cell Phone: 270-403-3611**
 2. **Campus Security Office Phone: 270-789-5556**
 3. **Natural Science Division Phone: 270-789-5065**
- C. **Safety:** A separate sheet will be passed out that must be read, understood, and signed by each student before participation in the laboratory will be allowed. *There are no exceptions to the safety rules.* Violation of any of the rules or any additional precautions for particular experiments relayed by the instructor will result in the student being removed from the lab, and repeated violations will result in a failing grade for the course.

- D. **Exams:** There are no exams in this course. The final grade will be based on the performance and write-up of lab experiments.
- E. **Lab Experiments:** The formal write-up for each experiment is due at the beginning of the next lab period after the experiment is completed. For each business day the write-up is turned in late past the due date, 20% of the possible points will be lost. After a write-up is one week late, a grade of zero will be given for that lab. Up to 20% of the grade on each lab report may be assigned based on demonstrating proper lab technique during the experiment as instructed by the professor. A detailed description of the format for lab reports will be given on a separate handout and should be followed exactly for each report. Although some lab experiments may be performed with a partner, lab reports are to be written and submitted by each student separately.
- F. **Structure of a Lab Report:** Scientific writing is very *structured*. Your report should have *numbered* sections with short section titles such as 'Background', 'Experimental Setup', 'Results', 'Discussion', 'Conclusions', or similar, numbered figures *with captions*, and numbered tables with captions. The pages must also be numbered. In general, the structure of a Lab Report might look as follows:
Cover page: Name of the experiment, name of students, date experiment was performed, date when the report is submitted. Reports of more than six pages require a Table of Contents. Optional: Short abstract (150 words or less). Sections may be arranged as follows:
1. Introduction, Background: Why is this experiment important, what can be learned from it? Provide relevant equations and discuss the theoretical foundation of the experiment.
 2. Experimental setup / Computational details: Describe the experimental setup and procedure, or the software used to perform calculations.
 3. Results: Provide the results of the measurements that you obtained, and describe how the data was processed further. Experimental and calculated data, as well as results derived from them, have *units*, which must be provided. If you don't provide units for each number the Lab Report is going to receive a low score. For measured data, and for data derived from it, also provide estimated error bars.
 4. Discussion: Discuss the results of the measurement, and any additional questions, topics, and discussion points mentioned in the Lab instructions. Sometimes it is easier to have combined Results and Discussion sections, but if you combine them you need to be particularly careful about structuring them properly. Use subsections if appropriate, also if you use separate sections for Results and the Discussion.
 5. Conclusions / Summary: Each technical report should end with some final conclusions or a concise summary of the results that were obtained (this is not a copy of the Abstract). Figure and Table captions should give a short description so the reader has some understanding of their content without reading the text. For tables, the units for all data should be provided in the caption if units are not already given in the column headers. Units for data plots should be included with the axis labels (axes always need to be labeled). Figure captions are usually placed below the figure, while table captions are above the table. Table columns must have headers stating what data are provided in the columns (usually with units), such as in the following hypothetical example (Table 1):

Table 1: Density of Compound A as a function of temperature.

T/K	g/cm ³
275	0.93
283	0.95

Make sure that each figure and each table that you provide is referenced by its number in the text and discussed appropriately. Equations should be numbered consecutively as well, such as follows:

$$E = mc^2 \text{ (1)}$$

References in the text made to the equations should use these labels. For instance, when referring to Eq. (1) above one indicates with the parentheses that this is an equation reference. It helps to make a technical report that contains many equations to be more easily readable. It is very important that any source of data, or other references such as the textbook or on-line sources used to prepare the Background section are properly cited at the end of the lab report. If you quote from a source, clearly indicate this (e.g. by using quotation marks or italic font, with a reference to the source). [From: <http://www.chemistry.buffalo.edu/documents/c329syllabusF2010.pdf>, accessed 9Aug2011.]

K. **Laboratory Notebook:** Students are required to keep a laboratory notebook detailing the procedures, data, etc., obtained in the lab analyses conducted during the course. The format for the notebook will be discussed in class. The first three pages of the notebook are left blank for your Table of Contents. The notebook pages must be used sequentially in *historical time order*. For example, while preparing for a lab, don't "skip" five or six pages, for example, for that particular experiment. In the laboratory, **all** information, data, calculations, notes, etc. should be recorded directly into this notebook and **not** on scrap paper. *Information written on anything other than the lab notebook pages (notebook paper, paper towels, etc) will be confiscated.*

The lab notebook should be written in blue or black permanent in a clear and concise format. Errors should be crossed out with a single line and the correction written next to it. Don't scribble completely over the error. Your notebook must reflect the absolute truth of your laboratory experience. Each page of your notebook must be dated. **Before you leave the laboratory each time you have done lab work, the instructor must review your work and initial and date your notebook just below where your entries end.**

Before entering the laboratory, the student should become thoroughly familiar with the experiment and prepare the notebook to make record keeping and report writing more convenient. Title, procedure, theory, and tables for data should be prepared prior to the laboratory period. Lab Reports should be typed on the computer and printed before being handed in. Students are encouraged to use the appropriate software to create figures, graphs or chemical drawings to create more professional looking lab report but some hand drawing of figures will be tolerated. **Formal lab reports are required for all experiments.**

L. **Teaching Methods:** The instructor will demonstrate important laboratory procedures, safety precautions and a review of necessary calculations at the beginning of the lab period. Students will then proceed to complete the assigned experiment. The instructor will be available to answer questions throughout the lab period.

M. **Classroom Behavior:**

1. Guests are only allowed in class at the discretion of and with prior approval from the instructor.
2. Electronic recording devices of any kind are not permitted except in special circumstances and with the specific permission of the instructor.
3. While you are expected to attend and participate in this class, your cell phone, computer, and MP3 players are **not**. Pagers, cell phones, and similar items are disruptive to the entire class and **must be turned off** during class. **The owner of any such device that activates during class will be immediately excused from class and counted as absent for the entire period.**
4. Use of cell phones, computers, and MP3 players during examinations and quizzes will be considered academic dishonesty, which will result in a zero being awarded for the quiz or examination (No exceptions!).
5. Hats and caps are to be removed prior to entering the classroom.
6. Take care of any physiological needs *before* coming into the classroom.
7. Unacceptable student behaviors:
 - a. Sleeping during class
 - b. Chronic tardiness. Be here ready to learn when class begins.
 - c. Reading, studying or working on materials for other classes.
 - d. Chatting with your classmates when the instructor or other classmates are speaking.
 - e. Prematurely packing up your books and bags before class has been dismissed.

N. **Academic Misconduct/Integrity:** Students in this course will be working toward mastery of the material to satisfy the course objectives. ***This class is held to an honor system, meaning that cheating, allowing someone to cheat, or failing to report known cases of cheating are all considered academic misconduct.*** Cheating includes, but is not limited to, any attempt to present the work of another as your own; discussing or copying exams, quizzes, or homework with students who have not yet completed them; using "cheat sheets" on exams or quizzes; altering a test for re-grade, plagiarism of primary or secondary sources of information or using programmable calculators to store and/or recall prohibited information for an exam. Any student who refuses to allow a calculator to be inspected by the instructor upon request will not be allowed to use that calculator on the exam/quiz. Be aware that aggressive methods are used to protect the majority of you who are honest. Violations will be dealt with according to the University and Divisional policies. A copy of the Division of Natural Sciences (DNS) policy on Academic Integrity will be available on the course TigerNet page. Please read this policy and

take it very seriously. For information about plagiarism and how to avoid it, consult the following website: <http://www.indiana.edu/~istd/>. Students will be asked to sign an integrity statement on each examination and quiz. The following statement reads as follows:

“I pledge on my honor that on this assignment/examination/quiz I have neither received nor given nor have I seen any dishonest work.

Signature _____ Date _____”

VII. BOOK LIST

None. (Handouts for experiments will be available.)

VIII. DISABILITIES

Campbellsville University is committed to reasonable accommodations for students who have documented physical and learning disabilities, as well as medical and emotional conditions. If you have a documented disability or condition of this nature, you may be eligible for disability services. Documentation must be from a licensed professional and current in terms of assessment. Please contact the Coordinator of Disability Services at 270-789-5192 to inquire about services.

IX. ACADEMIC SUPPORT

The Academic Support area, located in the Badgett Academic Support Center (BASC), exists to help students. At certain times, most students need some help with studying, choosing a career, major/minor, or assistance in a difficult course. The following services are available Career Services, Disability Services, tutoring, and the Citizens Bank & Trust Writing Center. These services are provided at no extra cost to the student. Space is also available for individual and group study, and laptop computers are available for students to check-out and use within the building. Information about these services is accessible by clicking on the “Current Students” tab on the University website at www.campbellsville.edu. Information is also available by calling the Office of Academic Support at (270) 789-5064.

X. TITLE IX

Campbellsville University and its faculty are committed to assuring a safe and productive environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office of Civil Rights, the University requires all responsible employees, which includes faculty members, to report incidents of sexual misconduct shared by students to the University’s Title IX Coordinator.

Title IX Coordinator:

Terry VanMeter

1 University Drive

UPO Box 944

Campbellsville, KY 42718

Administration Office 8A

Phone: 270-789-5016

Email: twvanmeter@campbellsville.edu

Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at: www.campbellsville.edu/titleIX

CHE 454 Spring 2017—TENTATIVE SCHEDULE OF EXPERIMENTS-REVISED

Date	Lab Experiment
Jan 18	No Lab
25	Check In Safety Procedures Acid Dissociation Constant of a Dye Indicator, Expt. #17
Feb 1	Expt. #17 continued
8	LECTURE EXAM 1
15	The Rate of Reaction between Acetone and Bromine, Expt. #31
22	Expt. #31 continued
Mar 1	Reaction Kinetics: Effect of Temperature on Reaction Rate, Expt. #33
8	Reaction Kinetics: Effect of Temperature on Reaction Rate, Expt. #33
<i>Mar 16</i>	<i>SPRING BREAK-NO LAB</i>
22	LECTURE EXAM 2
29	Computer Sim. pHet 1-D Particle in Box; Potential Well
Apr 5	Spectrum of a Particle in a Box; Expt. #34
12	Symmetry & Point Groups (computer simulation)
14-17	<i>EASTER HOLIDAY BREAK-NO CLASS</i>
19	Symmetry & Point Groups (computer simulation)
26	LECTURE EXAM 3
May 3	Check out Turn in lab notebooks
May 10	Finals Week

COURSE #: _____ SEMESTER: _____

COURSE TITLE: _____

Student's Acceptance of Course Policies

Please fill out and sign the following form and **return it no later than** _____ to the instructor.
Use a blue or black pen (no pencil).

I, _____, have read the entire syllabus describing the course
(print your name neatly)

policies for this course, taught by Ms. E. Kay Sutton. I fully understand these policies and I agree to comply with them during the entire _____ term.

Signature: _____ Date: _____