

Course Information

Date Submitted: 5/12/2016

Current Prefix and Number: CHE - Chemistry , CHE 440G INTRO PHYSICAL CHEMISTRY

Other Course:

Proposed Prefix and Number: CHE 440G

What type of change is being proposed?

Major Change

Should this course be a UK Core Course? No

1. General Information

a. Submitted by the College of: ARTS & SCIENCES

b. Department/Division: Chemistry

c. Is there a change in 'ownership' of the course? No

If YES, what college/department will offer the course instead: Select...

e. Contact Person

Name: Arthur Cammers

Email: a.cammers@uky.edu

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Responsible Faculty ID (if different from Contact)

Name: Dong-Sheng Yang

Email: dyang0@uky.edu

Phone: 859 257-4622

f. Requested Effective Date

Semester Following Approval: Yes OR Effective Semester:

2. Designation and Description of Proposed Course

a. Current Distance Learning (DL) Status: N/A

b. Full Title: INTRODUCTORY PHYSICAL CHEMISTRY

Proposed Title: INTRODUCTORY PHYSICAL CHEMISTRY

c. Current Transcript Title: INTRO PHYSICAL CHEMISTRY

Proposed Transcript Title: INTRO PHYSICAL CHEMISTRY

d. Current Cross-listing: none

Proposed – ADD Cross-listing :

Proposed – REMOVE Cross-listing:

e. Current Meeting Patterns

LECTURE: 4

Proposed Meeting Patterns

LECTURE: 3

f. Current Grading System: ABC Letter Grade Scale

Proposed Grading System: *Letter (A, B, C, etc.)*

g. Current number of credit hours: 4

Proposed number of credit hours: 3

h. Currently, is this course repeatable for additional credit? No

Proposed to be repeatable for additional credit? No

If Yes: Maximum number of credit hours:

If Yes: Will this course allow multiple registrations during the same semester? No

2i. Current Course Description for Bulletin: An introduction to the laws of thermodynamics, the thermodynamic functions and their application to phase equilibria, chemical equilibria, solutions and electrochemistry. Chemical kinetics, including rate laws, reaction mechanisms, Arrhenius, collision, and activated complex theories, and catalysis. Quantum theory including an elementary introduction to spectroscopy. The fourth hour to be devoted to problem solving and problem-solving techniques.

Proposed Course Description for Bulletin: A one-semester survey of thermodynamics, chemical kinetics, and quantum chemistry with an elementary introduction to spectroscopy. Prereq: PHY 213 or PHY 232; MA 114; CHE 226 or MA 213

2j. Current Prerequisites, if any: Prereq: PHY 213 or PHY 232; MA 114; CHE 226 or MA 213

Proposed Prerequisites, if any: no change

2k. Current Supplementary Teaching Component:

Proposed Supplementary Teaching Component: No Change

3. Currently, is this course taught off campus? No

Proposed to be taught off campus? No

If YES, enter the off campus address:

4. Are significant changes in content/student learning outcomes of the course being proposed? No

If YES, explain and offer brief rationale: There are no significant content changes proposed here. CHE 440G is our 1-semester survey of physical chemistry, currently offered as a four-credit course, with the extra hour being devoted to recitation and/or problem solving sessions. This course change would drop the recitation. Rationale: 1. CHE 442G (Thermodynamics and Kinetics), CHE 446G (Physical Chemistry for Engineers), CHE 547 (Principles of Physical Chemistry I) and CHE 548 (Principles of Physical Chemistry II) are all 3-credit courses. This change would make CHE 440G consistent with our other treatment of the topic. 2. Introductory Physical Chemistry had been taught successfully as a 3-credit course under course number CHE 444. At the request of the instructor around 1990-91, A&S Chemistry experimented with adding the recitation hour with concomitant increase in contact hours from 3 to 4; later the course number was changed to CHE 440G with the inclusion of graduate students. When the class was named CHE 444 only BA students took it. Last semester was reflective of the general population the students in CHE 440G (a) CHE BA (21%), (b) CHE BS Biochem Option track 2 (42%), (c) Chem Minors (11%) usually BIO BS (d) BIO BS (11%) not chem minors (e) the odd grad student needing to review (1%), (f) the remaining 15% is a scatter shot of apparently undeclared, Ag-Biotech etc. The point is that the reason for adding the recitation which originated from a single instructor for the CHE BA students only has faded. The Physical Chemistry Division in A&S Chemistry is convinced that the recitation session is unnecessary; class time can be diverted to problem-solving and office hours and student/ teacher electronic communication can close the practice gap. 3. The BA curriculum is currently a minimum of 122 hours; it would be beneficial to our students to decrease the number of credit hours if A&S Chemistry can do so responsibly. We think this change can be made responsibly. 4. Enrollments have increased to the point where A&S Chemistry will have to offer CHE 440G in the fall and spring semesters. The recitation impedes course scalability. The recitation could be handled by teaching assistants, however history has shown that it is very difficult to find qualified TAs for upper level physical chemistry.

5a. Are there other depts. and/or pgms that could be affected by the proposed change? No

If YES, identify the depts. and/or pgms: Engineering relies on UK chemistry to teach Physical Chemistry to their students, but that is a different course: CHE 446G, Physical Chemistry For Engineers. Sometimes engineering students take CHE 440G. This credit change would make CHE 440G more compatible with the engineering program.

5b. Will modifying this course result in a new requirement of ANY program? No

If YES, list the program(s) here:

6. Check box if changed to 400G or 500: No

Distance Learning Form

Instructor Name:

Instructor Email:

Internet/Web-based: No

Interactive Video: No

Hybrid: No

1. How does this course provide for timely and appropriate interaction between students and faculty and among students? Does the course syllabus conform to University Senate Syllabus Guidelines, specifically the Distance Learning Considerations?

2. How do you ensure that the experience for a DL student is comparable to that of a classroom-based student's experience? Aspects to explore: textbooks, course goals, assessment of student learning outcomes, etc.
3. How is the integrity of student work ensured? Please speak to aspects such as password-protected course portals, proctors for exams at interactive video sites; academic offense policy; etc.
4. Will offering this course via DL result in at least 25% or at least 50% (based on total credit hours required for completion) of a degree program being offered via any form of DL, as defined above?
- If yes, which percentage, and which program(s)?
5. How are students taking the course via DL assured of equivalent access to student services, similar to that of a student taking the class in a traditional classroom setting?
6. How do course requirements ensure that students make appropriate use of learning resources?
7. Please explain specifically how access is provided to laboratories, facilities, and equipment appropriate to the course or program.
8. How are students informed of procedures for resolving technical complaints? Does the syllabus list the entities available to offer technical help with the delivery and/or receipt of the course, such as the Information Technology Customer Service Center (<http://www.uky.edu/UKIT/>)?
9. Will the course be delivered via services available through the Distance Learning Program (DLP) and the Academic Technology Group (ATL)? **NO**
- If no, explain how student enrolled in DL courses are able to use the technology employed, as well as how students will be provided with assistance in using said technology.
10. Does the syllabus contain all the required components? **NO**
11. I, the instructor of record, have read and understood all of the university-level statements regarding DL.

Instructor Name:

UK Department of Chemistry
CHE 440G: Introduction to Physical Chemistry
Fall 2016
Course Description and Syllabus

Instructor: Chad Risko

Office Address: CP-217

Email: chad.risko@uky.edu

Meeting Times: MWF 9:00-9:50 a.m.

Classroom: CP-220

Office Hours: M 2:00-4:00 p.m.; W 10:00-11:00 a.m.

CHE 440G online resources: Canvas (<https://www.uky.edu/canvas/>)

Course Description:

A one-semester survey of thermodynamics, chemical kinetics, and quantum chemistry with an elementary introduction to spectroscopy. Prereq: PHY 213 or PHY 232; MA 114; CHE 226 or MA 213

Course Goals/Objectives:

Physical chemistry is the study of how matter behaves at the atomic and molecular level, and how and why chemical reactions occur. This course will provide students with the ability to describe fundamental chemical and physical characteristics of matter and change by making connections among concepts in chemistry, physics, and mathematics. Illustrative examples will be derived from classic chemical problems and cutting-edge research topics.

Student Learning Outcomes:

After completing this course, students will be able to:

1. Express mathematical foundations required to understand principles of thermodynamics, kinetics, and quantum mechanics
2. Describe physical and chemical change in the context of fundamental aspects of thermodynamics (e.g. energy, enthalpy, entropy)
3. Detail reaction rates and express complex reactions in terms of elementary steps
4. Illustrate foundational aspects of atoms and molecules within the rigor of quantum mechanics

Required Materials:

Physical Chemistry: Thermodynamics, Structure, and Change (10th Edition)

Peter Atkins & Julio de Paula [ISBN-13: 978-1429290197]

Recommended Materials:

Student Solutions Manual for Physical Chemistry (10th Edition)

Charles Trapp, Carmen Giunta, & Marshall Cady

Companion Website (study aids): <http://bcs.whfreeman.com/pchem10e>

Course Content (Tentative):

0. Foundations & Properties of Gases (Atkins & de Paula, Fundamental Materials & Chapter 1)
1. Introduction to Quantum Theory (Atkins & de Paula, Chapter 7)
2. Applications of Quantum Theory (Atkins & de Paula, Chapter 8)
3. Atomic Structure and Spectra (Atkins & de Paula, Chapter 9)

4. Molecular Spectroscopy (Atkins & de Paula, Chapters 12 & 13)
5. The First Law of Thermodynamics (Atkins & de Paula, Chapter 2)
6. The Second Law of Thermodynamics (Atkins & de Paula, Chapter 3)
7. Phase Equilibria (Atkins & de Paula, Chapters 4 & 5)
8. Chemical Equilibria (Atkins & de Paula, Chapter 6)
9. Kinetics of Chemical Reactions (Atkins & de Paula, Chapter 21)
10. Collision Theory and Transition State Theory (Atkins & de Paula, Chapters 22 & 23)

Examinations:

There will be two in-class Exams and one Final Exam. Any student with a legitimate conflict with an exam time must inform me in writing, according to University regulations posted online by the Office of the Registrar (<http://www.uky.edu/Registrar/bulletinCurrent/toc2.htm>).

Exam 1:	Wednesday, September 28
Exam 2:	Wednesday, November 2
Final Exam:	Monday, December 12 [10:30 am – 12:30 pm]

Grading:

Grades will be assigned according to the following tentative scheme. Ranges may be lowered but will not be raised. A: 85-100%; B: 75-84%; C: 60-74%; D: 50-59%.

A grade of D cannot be awarded to graduate students. Therefore, graduate students whose course averages are in the D range will receive E grades.

The Department of Chemistry adheres rigorously to University policy about awarding I (incomplete) grades. See "Student Rights and Responsibilities" at: www.uky.edu/StudentAffairs/Code/, Part II: Rules of University Senate, Section V, 5.1.3.2.

Undergraduate Students

Class Participation:	10%
Exam 1:	20%
Exam 2:	20%
Physical Chemistry Project:	15%
Final Exam (cumulative):	35%

Mid-term grades (for undergraduates) will be posted in *myUK* by the deadline established in the Academic Calendar: October 10 – 21, 2015.

Graduate Students

Class Participation:	10%
Exam 1:	20%
Exam 2:	20%
Physical Chemistry Project:	15%
Final Exam (cumulative):	35%

Physical Chemistry Projects:

For undergraduate students, the project will consist of a two-page document that (i) provides a summary of one article in the peer-reviewed literature and (ii) connects the physical chemistry principles discussed in the course to the article. A template for the document will be made available on *Canvas*. Articles need to be from the current literature, which we will define as 2012 to the present.

For graduate students, the project will consist of (i) a literature survey of at least five pages in length and (ii) a 10 minute, in-class presentation. A minimum of at least three articles in the peer-reviewed literature need be included in the review, and connections between the articles and the material discussed during the course need to be made.

Important Dates:

Labor Day Holiday:	Monday, September 5
DRC / Absence Notification:	Wednesday, September 7
Biosketch Due:	Wednesday, September 7
Course Withdrawal – w/o Appearing on Transcript:	Wednesday, September 14
Exam 1:	Wednesday, September 28
Physical Chemistry Topics Due:	Friday, October 21
Exam 2:	Wednesday, November 2
Course Withdrawal – Last Day	Friday, November 4
Thanksgiving Holiday:	Wednesday – Saturday, November 23 – 26
Physical Chemistry Project Due:	Friday, December 2
In-Class Presentations (Graduate Students):	Friday, December 2
Final Exam:	Monday, December 12 [10:30 am – 12:30 pm]

Please see the Academic Calendar (<http://www.uky.edu/Registrar/AcademicCalendar.htm>) for additional important dates.

Course Administration and Policies:

Email and Communication. In all emails, please include the Course Number (CHE 440G) and information pertaining to the nature of the email in the Subject line. In the body of the message, in addition to your question, also be sure to include your full name and UK student ID number. Messages containing inappropriate or offensive language or tone will not be answered and may be subject to disciplinary action.

Canvas:

To access *Canvas*, go to <https://www.uky.edu/canvas/>. Your username and password are the same as your UK email address. It is your responsibility to log in for announcements. Log in to *Canvas* as soon as possible so that any technical problems can be solved.

Once in *Canvas*, click on the link for CHE 440G. You will use *Canvas* to access the following content areas using the links on the left side of the home page.

1. Announcements: The course home page displays current announcements. Log into *Canvas* daily so that you can read announcements.
2. Syllabus: A pdf of this document.
3. Course Help: Office hours and other resources.
4. Assignments: Homework problems, miscellaneous material, etc.
5. Grades: Course grades.
6. Quizzes: Online, pre-class quizzes.

Canvas support is available 24/7/365. Click the Help menu in the global navigation for additional live chat and toll-free telephone options. You may also contact UKIT Customer Service by calling 218-4357 (218-HELP), by visiting 111 McVey Hall (M–F, 7:00 a.m. –6:00 p.m.) or by visiting Tech Help @ the Hub in the basement of W.T. Young Library (M–F 10:00 a.m. – 6:00 p.m.). You may also email your questions to 218help@uky.edu. The helpdesk may be slower in responding to email requests than to phone calls or personal visits to McVey Hall or Tech Help.

Attendance Policy: Attendance is required, but is not checked. Important information and announcements may be presented in class only, and you are responsible for knowing the information that is presented in class.

Class Participation. Your success in class will be dependent on 1) attendance and 2) participation in class activities. As part of your Class Participation grade, you will be required to submit a biosketch by **September 7** and take pre-class quizzes. The pre-class quizzes will be administered through *Canvas*, and be posted the afternoon prior to class and be available until 8:30 am the day of class. Missed pre-class quizzes may be excused following the excused absence policy.

Excused Absences: Students need to notify the professor of absences prior to class when possible. Senate Rules 5.2.4.2 defines the following as acceptable reasons for excused absences: (a) serious illness, (b) illness or death of family member, (c) University-related trips, (d) major religious holidays, and (e) other circumstances found to fit “reasonable cause for nonattendance” by the professor.

Students anticipating an absence for a major religious holiday are responsible for notifying the instructor in writing of anticipated absences due to their observance of such holidays no later than the last day in the semester to add a class. Two weeks prior to the absence is reasonable, but should not be given any later. Information regarding major religious holidays may be obtained through the Ombud (859-257-3737, http://www.uky.edu/Ombud/ForStudents_ExcusedAbsences.php).

Students are expected to withdraw from the class if more than 20% of the classes scheduled for the semester are missed (excused) per University policy.

Per Senate Rule 5.2.4.2, students missing any graded work due to an excused absence are responsible: for informing the Instructor of Record about their excused absence within one week following the period of the excused absence (except where prior notification is required); and for making up the missed work. The professor must give the student an opportunity to make up the work and/or the exams missed due to an excused absence, and shall do so, if feasible, during the semester in which the absence occurred.

Accommodations due to Disability: If you have a documented disability that requires academic accommodations, please see me as soon as possible during scheduled office hours. In order to receive accommodations in this course, you must provide me with a Letter of Accommodation from the Disability Resource Center (DRC). The DRC coordinates campus disability services available to students with disabilities. It is located on the corner of Rose Street and Huguelet Drive in the Multidisciplinary Science Building, Suite 407. You can reach them via phone at (859) 257-2754 and via email at drc@uky.edu. Their web address is <http://www.uky.edu/DisabilityResourceCenter>.

Any student with a certified disability must provide appropriate documentation (obtained from the Disability Resource Center) to the Instructor **no later than September 7**.

Cell Phone and Laptop Policy: Tablets and laptops may be used for taking notes. Note that any student sending or receiving text messages during class may be required to show their student ID to the Instructor and may be reported to the Dean of Students.

Examinations: Bring a photo identification card (preferably in color), one or more #2 pencils, and a scientific calculator to all examinations. Non-graphing calculators with simple numerical memory, logarithmic and exponential functions are preferred; please see the instructor if you have a question on whether or not you can use a particular calculator. Cell phones and any other form of electronic communication devices are strictly prohibited during exams. All personal belongings (backpacks, purses, pagers, phones, other electronic devices, hats, jackets, etc.) must be placed out of reading distance at the front, back, or sides of the room during the exam.

Make-up Exams: *It is extremely important to take all exams when scheduled.* Formal written excuses consistent with University regulations will be required for each exam absence before a makeup exam can be scheduled. Makeup exams for students with excused absences will be scheduled in accordance with the student's schedule. Failure to take an exam or provide a formal written excuse consistent with University regulations will result in zero credit for that examination. Notice of intended absence due to a religious holiday must be presented in writing **no later than September 7.**

Dropping the Course: The last day to drop this course without it appearing on your transcript is **September 14.** The last day to withdraw from this course is **November 4,** except for urgent non-academic reasons related to extended illness or equivalent distress.

In-Class Behavior: Students who violate the rules for civil behavior in class will be told to leave the class.

Academic Integrity: Per university policy, students shall not plagiarize, cheat, or falsify or misuse academic records. Students are expected to adhere to University policy on cheating and plagiarism in all courses. The minimum penalty for a first offense is a zero on the assignment on which the offense occurred. If the offense is considered severe or the student has other academic offenses on their record, more serious penalties, up to suspension from the university may be imposed.

Plagiarism and cheating are serious breaches of academic conduct. Each student is advised to become familiar with the various forms of academic dishonesty as explained in the Code of Student Rights and Responsibilities. Complete information can be found at the following website: <http://www.uky.edu/Ombud>. A plea of ignorance is not acceptable as a defense against the charge of academic dishonesty. It is important that you review this information as all ideas borrowed from others need to be properly credited.

Part II of Student Rights and Responsibilities (available online <http://www.uky.edu/StudentAffairs/Code/part2.html>) states that all academic work, written or otherwise, submitted by students to their instructors or other academic supervisors, is expected to be the result of their own thought, research, or self-expression. In cases where students feel unsure about the question of plagiarism involving their own work, they are obliged to consult their instructors on the matter before submission.

When students submit work purporting to be their own, but which in any way borrows ideas, organization, wording or anything else from another source without appropriate acknowledgement of the fact, the students are guilty of plagiarism. Plagiarism includes reproducing someone else's work, whether it be a published article, chapter of a book, a paper from a friend or some file, or something similar to this. Plagiarism also includes the practice of employing or allowing another person to alter or revise the work which a student submits as his/her own, whoever that other person may be.

Students may discuss assignments among themselves or with an instructor or tutor, but when the actual work is done, it must be done by the student, and the student alone. When a student's assignment involves research in outside sources of information, the student must carefully acknowledge exactly what, where and how he/she employed them. If the words of someone else are used, the student must put quotation marks around the passage in question and add an appropriate indication of its origin. Making simple changes while leaving the organization, content and phraseology intact is plagiaristic. However, nothing in these Rules shall apply to those ideas which are so generally and freely circulated as to be a part of the public domain (Section 6.3.1).

Please note: Any assignment you turn in may be submitted to an electronic database to check for plagiarism.