

COURSE SYLLABUS

Department: Chemistry
Course No.: CHE 420-01
Semester: Spring 2006
Credit Hrs.: 4
Lecture: 0930-1020 MWF, BL 359
Lab: 0830-1120 Th, BL 356

Instructor: H.B. Fannin
Office Hrs: As posted or by appointment
Phone: 762-4490

- I. Title: Physical Chemistry II
- II. Catalog Description: A continuation of CHE 410 including solution chemistry, electrochemistry, chemical kinetics, basic quantum chemistry, and basic statistical mechanics. Three lectures and three hours of laboratory per week. Prerequisite: CHE 410.
- III. Purpose: To provide the students with a rudimentary knowledge of the behavior of microscopic systems and the effect of this behavior on macroscopic properties of the system.
- IV. Course Objectives: To acquaint students with the basic concepts of quantum mechanics, spectroscopy, and kinetic molecular theory.

V. Content Outline:

- Chp. 1* From Classical to Quantum Mechanics
Chp. 2 The Schrodinger Equation
Chp. 3 The Quantum Mechanical Postulates
Chp. 4 Using Quantum Mechanics on Simple Systems
Chp. 5 The Particle in the Box and the Real World
Chp. 6 Commuting and Noncommuting Operators
Chp. 7 A Quantum Mechanical Model for the Vibration and Rotation of
Molecules
Chp. 8 The Vibrational and Rotational Spectroscopy of Diatomic Molecules
EXAM I
Chp. 9 The Hydrogen Atom
Chp. 10 Many-Electron Atoms
Chp. 11 Examples of Spectroscopy Involving Atoms
EXAM II
Chp. 12 Chemical Bonding in H_2^+ and H_2
Chp. 13 Chemical Bonding in Diatomic Molecules
Chp. 14 Molecular Structure and Energy Levels for Polyatomic Molecules
Chp. 15 Electronic Spectroscopy
Chp. 17 Molecular Symmetry
EXAM III
Selected Topics if time permits

Chp. 18	Nuclear Magnetic Resonance Spectroscopy
Chp. 16	Computational Chemistry
Chp. 32	Kinetic Theory of Gases
	FINAL EXAM

* refers to chapters of required text

VI. Instructional Activities:

Lecture

Examinations will be announced approximately one week in advance. Examinations will generally be given during the laboratory period. The final examination will be an ACS standardized exam covering quantum chemistry. In addition, quizzes will be given on an unannounced and irregular basis. Also, various projects or selected readings may be assigned during the course.

Homework problems should be done during the course. These problems will not be graded but will serve as illustrative examples of principles introduced in the lecture.

VII. Field, Clinical, Laboratory Experiences

Laboratory

Six to ten laboratory experiments will be performed during the semester. (A separate lab schedule will be provided.) These experiments will require reports, similar in format to the example in the laboratory manual, be prepared, typewritten, and submitted one week after the experiment is performed. Late reports will be accepted only at the discretion of the instructor or teaching assistant and may be penalized up to the full value of the report. In addition to experiments, laboratory time may be utilized for examinations, extended lectures, or tutorials.

Safety is of the utmost importance in the laboratory!! All students are required to wear an approved form of eye protection in the laboratory. Failure to wear eye protection will result in ejection from the laboratory. For further information with regard to safety and general laboratory procedures the introductory pages of the lab manual should be consulted.

VIII. Resources:

The library has excellent holdings of introductory physical chemistry texts. These texts should be consulted if the student desires a different or alternative presentation of various topics. Additionally, students are encouraged to utilize office hours in needed.

XI. Grading Procedures:

Exam I	100 pts.
Exam II	100
Exam III	100
Final	125
Lab	100
Quizzes & assignments	<u>75</u>
Total	600 pts.

The standard university scale will be utilized for grade determination in the course, i.e.:
A=90-100%, B=80-89%, C=70-79%, D=60-69%, E=<60%

X. Attendance Policy:

While students are not required to attend, most students will find it beneficial to do so. In general, make-ups for laboratory or examinations will not be given. At the instructor's discretion make-ups may be given for serious reasons, such as illness or accidents. However, a written request for make-up must be submitted to the instructor within three (3) calendar days of the missed assignment. If the request is granted, the instructor will arrange a date and time for the make-up. Make-up exams may be either written and/or oral in content. For additional information, see page 10 of the 2005-07 Undergraduate Bulletin.

XI. Academic Honesty Policy:

Cheating, plagiarism, falsification of data, and all other forms of academic dishonesty are **not** permitted. Don't do it or I'll kick you out of the course with an E. Additional punitive actions may also be taken. For further information, see the official policy on page 10 of the 2005-07 Undergraduate Bulletin

XII. Texts

Quantum Chemistry and Spectroscopy, T Engel and P.J. Reid. Pearson Inc., San Francisco, CA, 2006.

"Laboratory Experiments, Physical Chemistry", M.B. Henley, MSU

XIII. Prerequisites: CHE 410

XIV. STATEMENT OF AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY: Murray State University does not discriminate on the basis of race, color, national origin, sex, religion, marital status, age, or disability in employment, admission, or the provision of services, educational programs and activities, and provides, upon request, reasonable accommodation including auxiliary aids and services necessary to afford individuals with disabilities an equal opportunity to participate in all programs and activities. For information regarding nondiscrimination policies contact the Office of Equal Opportunity, 270-762-3155.

Tentative Laboratory Schedule
Chemistry 420
Spring 2006

EXP 1	Charge to Mass Ratio of an Electron	Lab Book
EXP 2	Charge on the Electron	Lab Book
EXP 3	Visible Spectrum of a Conjugated Dye	Lab Book
EXP 4	Hydrogen Spectrum	Handout
EXP 5	Helium Spectrum	Handout
EXP 6	Infrared Spectrum of HCl	Handout
EXP 7	Nitrogen Band Spectrum	Handout
EXP 8	Absorption Spectrum of Iodine	Handout

Note: The order, number, and nature of these experiments may be changed at the instructor's discretion.