

PHYSICAL CHEMISTRY I

CHE 360-001

FALL 2007

All items on this syllabus are subject to change by the instructor.

W. Vernon Hicks, Jr.

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Office Hours: 7:30 - 8:00 AM MWF (in SC 402)
9:05 - 9:45 AM MF
11:05 - 11:50 AM MWF
other times by appointment

Class Schedule: 8:00-8:50 AM, MWF, SC 402

Prerequisite: C or better in CHE 121, MAT 220 or equivalent

Prerequisite/Corequisite: PHY 222 or 213

Text: *Physical Chemistry*, 5th ed., by Ira M. Levine.
The first 14 chapters will be covered.

Optional Supplement: *Student Solution Manual to Accompany Physical Chemistry, 5th ed.*,
by Ira Levine

Regular Exams (4): 100 points each

Tests: Four regular tests, 100 points each. Final exam, 150 points; homework and class assignments or quizzes, 0-150 points. The lowest regular test (or part of the final, if it is lower than any of the 4 regular tests) will be dropped. If a regular test is missed for any reason, that will be the one dropped. If more than five quizzes are given, the lowest quiz will be dropped; if twelve or more quizzes are given, the lowest two quizzes will be dropped. Assigned homework may be taken up and graded if advanced notice is given. The final exam will consist of two parts, a standardized ACS test and a portion written by the instructor covering Chapter 14.

Regular tests usually require more than one hour and some may be scheduled outside the normal class period. Use of a hand calculator is suggested for regular tests and for the final exam.

Notes: The final exam at the end of CHE 361 is a standardized exam covering both semesters of physical chemistry (CHE 360 and CHE 361).

Last day to drop with a "W" is October 29.

Students are responsible for reading and understanding all items on this syllabus. Any items not understood must be brought to the attention of the instructor within the first two weeks of class.

Grade Scale (%):	A	90 - 100
	B	80 - 90
	C	70 - 80
	D	60 - 70
	F	below 60

Test 1	Chapters 1, 2, 3
Test 2	Chapters 4, 5, 6
Test 3	Chapters 7, 8, 9, 10
Test 4	Chapters 11, 12, 13
Exam	Comprehensive (includes 14) Wednesday, Dec. 12 8:00-10:00 AM (a portion of the final will be scheduled at a different time)

The work you will do in any course is subject to the Student Honor Code. The Honor Code is a commitment to the highest degree of ethical integrity in academic conduct, a commitment that, individually and collectively, the students of Northern Kentucky University will not lie, cheat, or plagiarize to gain an academic advantage over fellow students or avoid academic requirements. The Honor Code can be accessed at: <http://www.nku.edu/~deanstudents/policies.htm> .

Cheating will not be tolerated. In accordance with the Code of Student Rights and Responsibilities, which also can be found at <http://www.nku.edu/~deanstudents/policies.htm>, faculty members have the right to determine actions to be taken when a student is caught cheating.

Students caught cheating or plagiarizing for the first time will receive a grade of zero for that test or assignment. Students caught cheating or plagiarizing a second time will receive an F for the course and will be reported to the Dean of Students.

Faculty members reserve the right to dismiss or to have removed a disruptive student from their classrooms.

Students with disabilities who require accommodations (academic adjustments, auxiliary aids or services) for this course must register with the Disability Services Office. Please contact the Disability Service Office immediately in the University Center, Suite 320 or call 859-572-6373 for more information. Verification of your disability is required in the Disability Services Office for you to receive reasonable academic accommodations. Visit the Disability Services website at www.nku.edu/~disability/ .

Appropriate Department of Chemistry Student Learning Outcomes

1. Explain the major concepts and experimental findings in the chemical sciences.
3. Utilize critical thinking skills to apply concept knowledge ... to: ...b) solve scientific problems
7. Evaluate the relationships between chemistry and mathematics, physics, biology, and other disciplines and between chemistry and society.
8. Apply computer technology and other technologies in the comprehension, interpretation, and presentation of the chemical sciences.

Some Specific Learning Objectives

- A. Use calculus and physics in chemical calculations. (3, 7)
- B. Explain the three laws of thermodynamics and apply these laws to physical changes, chemical reactions, phase equilibria, and chemical equilibria. (1, 3)
- C. Use computer software to graph and interpret data. (8)

CHE 360 Assigned Problems

Chapter	Page	Problems
1	34	1.1, 1.3, 1.9, 1.20, 1.21, 1.25, 1.27, 1.31, 1.34, 1.40, 1.43*, 1.50, 1.54, 1.60, 1.65, 1.69 * add (b) Find an expression for dz, the total differential
2	74	2.33, 2.34, 2.37, 2.39, 2.44, 2.46, 2.47, 2.48, 2.49, 2.50, 2.51, 2.55, 2.59, 2.66, 2.67, 2.59. May browse 2.69 (True/False)
3	103	3.2, 3.10, 3.11, 3.13, 3.15, 3.17, 3.18, 3.19, 3.22, 3.28 (just note solution; need not do), 3.31, 3.34, 3.42, & Additional "Find ΔS for each ideal gas process of Prob. 2.51 and ΔS for the entire cycle"
4	136	4.11, 4.13, 4.14, 4.16, 4.17, 4.18, 4.27, 4.29, 4.32, 4.33, 4.38, 4.47, 4.48, 4.51, 4.59
5	170	5.2, 5.5, 5.10, 5.15, 5.16, 5.18, 5.24, 5.25, 5.27(also fit $C_{P,m}=A+BT+CT^2+D/T^2$) 5.38, 5.39 (also find ΔG°_{370}), 5.44, 5.49, 5.52, 5.60, 5.61, 5.63, 5.64. Note how worked: 5.33, 5.55
6	198	6.4, 6.11, 6.18, 6.19, 6.22, 6.23, 6.24, 6.31, 6.35, 6.36, 6.37, 6.46, 6.49, 6.50, 6.51, 6.63 (T/F)
7	226	7.3, 7.5, 7.14(sketch phase diagram), 7.18, 7.23, 7.24, 7.28, 7.29, 7.31, 7.34, 7.35, 7.44, 7.47, 7.50, 7.55 Note: some answers use older ΔH_{tr} rather than $\Delta_{tr}H$.
8	221	8.2, 8.7, 8.9, 8.19, 8.21, 8.31 (add [a] by using (8.27)), 8.32, 8.35, 8.36 (<u>note only</u>), 8.38, 8.41, 8.42
9	276	9.12, 9.13, 9.25, 9.27, 9.35, 9.36, 9.37, 9.38, 9.44, 9.47, 9.50, 9.52, 9.65, 9.55
10	314	10.6, 10.7, 10.11, 10.13, 10.25, 10.26, 10.28, 10.36, 10.37, 10.47, 10.50, 10.61, 10.62, 10.64, 10.70 10.13 Just note that can get one activity coefficient from another
11	337	11.8, 11.10, 11.11, 11.12, 11.13, 11.19, 11.25, 11.27 (should be γ^\pm not γ_\pm), 11.28, 11.29, 11.30, 11.31, 11.37, 11.38, 11.44, 11.47 11.16 May do if time; similar to 11.28 11.21 Need not work out; just note $K^\circ_{ca} \approx K^\circ_{ma}$ as $m_i \approx c_i$ dilute aq.soln. 11.43 Biochemists should note
12	378	12.3, 12.7, 12.9, 12.14, 12.18, 12.31, 12.36, 12.39, 12.44, 12.45, 12.46, 12.48, 12.49, 12.64, 12.66, 12.72 12.16 = $0.713 \text{ atm} \times \frac{760 \text{ mm Hg}}{1 \text{ atm}} \times \frac{\text{eHg}}{\text{eH}_2\text{O}} \left(\frac{13.6 \text{ g/cm}^3 \text{ at } 25^\circ\text{C}}{0.997 \text{ g/cm}^3} \right) = 7.4 \text{ m}$
13	406	13.4, 13.5, 13.9, 13.10, 13.11, 13.24, 13.25, 13.32, 13.34 (optional), 13.35 13.7 just note small size
14	451	14.5, 14.17, 14.24, 14.27, 14.29, 14.35, 14.38, 14.41, 14.46, 14.47, 14.49, 14.51, 14.55, 14.62, 14.68