

**STATE UNIVERSITY OF NEW YORK-POTSDAM**  
**DEPARTMENT OF CHEMISTRY**  
**PHYSICAL CHEMISTRY COURSE**

CHEM 451 – Lecture

Syllabus – Fall 2009

**Instructor**

Dr. Fadi Bou-Abdallah; Stowell Hall, Room 302B; Phone: 2268;  
Email: bouabdf@potdam.edu

**Lecture & Office Hours**

Lecture: MWF 9:00 - 9:50 am (Kellas Hall, Room 101)

Office hours: My door is always open – I welcome students anytime  
(or by appointment)

**Textbook**

ELEMENTS OF PHYSICAL CHEMISTRY

by Peter Atkins and Julio de Paula, Fifth Ed., 2009 – W. H. Freeman and Co., NY

<b>Grading:</b>	3 One Hour Exams	300	(18.18 % each or 54.54 % total)
	5 Quizzes -	100	(3.64 % each or 18.18 % total)
	Final Exam -	<u>150</u>	(27.27 % each or 27.27 % total)
	<b>TOTAL</b>	<b>550 pts</b>	<b>(100 %)</b>

**Hour Exam Schedule**

Exams I, II & III will be held Fridays Sept. 25, Oct. 23, and Nov. 20 from 8:00 am – 9:50 am.  
There is **NO** exam make-up. Emergency and health problems will be considered.

**Quiz Schedule**

Fridays Sept. 5, Sept 18, Oct. 2, Oct. 16, Nov. 6 and Dec. 4. The **six quizzes** will be about 30 minutes (8:50 am – 9:20 am) covering material since the previous quiz. *The lowest quiz score will be dropped.* There is *no* makeup for a missed quiz.

**Final Exam**

A comprehensive final exam will be given on Thurs., Dec. 17, 12:30 pm – 2:30 pm.

**Topics**

Introduction and Properties of Gases (Intro & Chap. 1)

First, Second and Third Law of Thermodynamics (Chaps. 2, 3 & 4)

Physical and Chemical Equilibria and Properties of mixtures (Chaps. 5, 6 & 7)

Electrochemistry (Chap. 9)

\* Please note that we may cover the Kinetic Theory of Gases; Applications of Gibbs and Helmholtz Energies, Non-electrolyte and Electrolyte Solutions in a little more detail than the textbook offers. Therefore, we may not have time to cover Electrochemistry since most of you have studied this topic either in Quantitative or Instrumental Analysis!

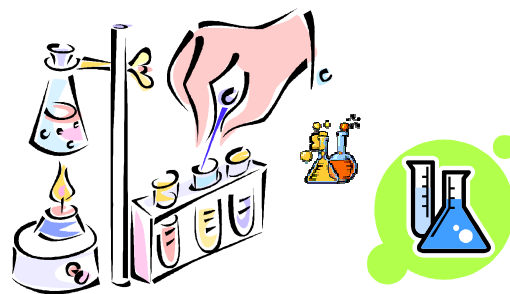


## CHEM 451 – Laboratory Syllabus – Fall 2009

**Where:** Stowell, Room 311

**When:** Monday, 1:00 – 3:50 PM

Generally, a lab lecture is given 15-20 min before lab starts.



### Pre- & Co-requisites

General chemistry (Chem 105 and Chem 106),  
Calculus (Math 151, 152), Physics (Phys 103, 204)

### Required Material

- 1) A lab manual which can be purchased at the Bookstore for approximately \$20. You must bring your own lab manual when you come to lab.
- 2) Laboratory notebook with duplicate pages or carbon paper. Your best buy is probably the Bookstore (approximately \$22 for 100 page or \$13 for 50 page notebook). You can re-use this notebook in PChem II (CHEM452)
- 3) Safety goggles/glasses. These may be purchased at the bookstore too. They sell for \$ 8 to \$15 a piece (depending on the type/model).

### Grading

Grades will be based on your performance on six experiments, each of which is given equal weight. This includes your preparation before coming to lab in the form of a pre-lab exercise (except for lab #1 - Data Analysis), your performance in the laboratory and your laboratory report as follows:

- **Pre-Lab questions** (25%)
- **In-Lab performance** (5%): this includes preparedness, etiquette, performance and clean up.
- **Notebook/Yellow Sheets** (5%): you must submit a yellow sheet with your lab report showing your laboratory notes and calculation for each experiment.
- **Lab Report** (65%): it includes the “Abstract” (10%), “Experimental Procedure” (10%), Results and Calculations (20%), Discussion (20%) and References (5%)

### Grades:

**A: 90-100 (4.0); A<sup>-</sup>: 85-89 (3.7); B<sup>+</sup>: 80-84 (3.3); B: 75-79 (3.0); B<sup>-</sup>: 70-74 (2.7);  
C<sup>+</sup>: 65-69 (2.3); C: 60-64 (2.0); C<sup>-</sup>: 55-59 (1.7); D: 50-54 (1.3); F: < 54 (Fail)**

Schedule of Pchem experiments per group (check calendar below for dates)

	Data Analysis I	Effusion-Diffusion	Heat Capacity of Gases	Liq-Vap Azeotrope	Bomb Calorimetry	Vapor Pressure of Pure Liquids
Group I	Lab #1	Lab #3	Lab #2	Lab #4	Lab #5	Lab #6
Group II	Lab #1	Lab #2	Lab #4	Lab #3	Lab #6	Lab #5
Group III	Lab #1	Lab #4	Lab #3	Lab #2	Lab #5	Lab #6

**Note: Any student who does not return his lab reports will fail the class. Late lab reports will be automatically assigned a grade of ZERO! NO EXCEPTION . . .**

## CHEM 451 LEC & LAB Course Goals:

This course is intended to acquaint students with some experimental physical chemistry techniques and their applications to studying chemical reactions. The students are expected to:

- leave the class with an appreciation for the importance and relevance of physical chemistry in your everyday life
- have learned a few of the instrumental techniques (data collection and analysis) and their underlying theory
- understand the meaning of the numbers obtained from these methods and critically evaluate their validity
- write scientific reports/papers and present data in front of an audience or in a conference setting

## Lab Lectures and Experiments

The experiment to be performed will be briefly discussed before lab starts. During laboratory time, professor will circulate among students and provide information regarding proper calculation and data analysis needed for writing a good lab report. You will perform six experiments, each of which takes two lab periods to complete. Prelabs are due before the start of any given experiment and lab reports are due two weeks after the completion of the lab.

**Late lab reports will not be accepted and will receive a grade of 0 (No exceptions).**

---

### Available Pchem Experiments:

- Data Analysis I: Data Analysis and Use of Excel - Lab #1 (No Prelab)**
- Kinetic Theory of Gases: Effusion-Diffusion**
- Heat Capacity of Gases: Adiabatic Expansion of Gases**
- Phase Equilibria: Liquid-Vapor Azeotropes**
- Enthalpy of Combustion: Bomb Calorimetry**
- Enthalpy of Vaporization: Vapor Pressure of Pure Liquids**

---

## CHEM 451 – Recitation Hour

Pchem recitation hours will be scheduled at the beginning of the semester!

Although the “Recitation Hour” (a one credit course) is not a required course, I would strongly recommend every student to register for the course. Often, recitation hours strengthen the student’s understanding of a concept learned in the classroom. I usually review important materials that students need to know before a scheduled quiz or test.



## Grading

Grades for the recitation hour course are based on two criteria: 1) your preparedness (50%) and 2) your participation (50%) in the course. Each week, you will be assigned a set of problems to work on at home (preparedness). Your active participation in the course (asking and answering questions) constitutes the other 50% of the grade.

## Grades:

**4.0 = Always prepared and engaged; Very good participation!**

**2.0 = Prepared but rarely participate; A grade of 0.0 will be assigned to students who come unprepared and don't participate**

**Please note that your presence in every “Recitation Hour” is required!**  
**Failure to show up will negatively affect your grade in the course.**

# September

## Chemistry 451 Calendar Fall 2009

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
<b>August 30</b>	<b>August 31</b> 1 <sup>st</sup> day of Class  Start Lab #1 Data Analysis					
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>  Quiz I	<b>5</b>
<b>6</b>	<b>7</b> Finish Lab #1 Data Analysis	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>
<b>13</b>	<b>14</b> Start Lab #2 Prelab #2 due	<b>15</b>	<b>16</b>	<b>17</b>	<b>18</b>  Quiz II	<b>19</b>
<b>20</b>	<b>21</b> Finish Lab #2 Lab report #1 due	<b>22</b>	<b>23</b>	<b>24</b>	<b>25</b> Hour Exam I	<b>26</b>
<b>27</b>	<b>28</b> Start Lab #3 Prelab #3 due	<b>29</b>	<b>30</b>			

2009

**October****Chemistry 451 Calendar Fall 2009**

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
				<b>1</b>	<b>2</b> <b>Quiz III</b>	<b>3</b>
<b>4</b>	<b>5</b> Finish Lab #3 Lab report#2 due	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b> Fall recess starts @ 10 pm	<b>10</b> Fall recess
<b>11</b> Fall recess	<b>12</b> Fall recess	<b>13</b> Fall recess	<b>14</b>	<b>15</b>	<b>16</b> Mid-semester Quiz IV	<b>17</b>
<b>18</b>	<b>19</b> Start Lab #4 Prelab #4 due	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b> Hour Exam II	<b>24</b>
<b>25</b>	<b>26</b> Finish Lab #4 Lab report #3 due	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b> Halloween
						<b>2009</b>

# November

## Chemistry 451 Calendar Fall 2009

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
<b>1</b>	<b>2</b> Start Lab #5 Prelab #5 due	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b> Quiz V	<b>7</b>
<b>8</b>	<b>9</b> Finish Lab #5 Lab report #4 due	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>
<b>15</b>	<b>16</b> Start Lab #6 Prelab #6 due	<b>17</b>	<b>18</b>	<b>19</b>	<b>20</b> Hour Exam III	<b>21</b>
<b>22</b>	<b>23</b> Finish Lab #6 Lab report #5 due	<b>24</b>	<b>25</b> Thanksgiving	<b>26</b> Thanksgiving	<b>27</b> Thanksgiving	<b>28</b> Thanksgiving
<b>29</b> Thanksgiving	<b>30</b> Create Your Own Pchem Lab Expt..					

2009

**December****Chemistry 451 Calendar Fall 2009**

<i>Sun</i>	<i>Mon</i>	<i>Tue</i>	<i>Wed</i>	<i>Thu</i>	<i>Fri</i>	<i>Sat</i>
		<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b> Quiz VI	<b>5</b>
<b>6</b>	<b>7</b> No Lab Lab report #6 due	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b> Last Day of Classes	<b>12</b>
<b>13</b>	<b>14</b> Final Exams	<b>15</b> Final Exams	<b>16</b> Final Exams	<b>17</b> Pchem Final Exam 12:30-2:30 pm	<b>18</b> Final Exams	<b>19</b>
<b>20</b>	<b>21</b>	<b>22</b> Final Grades Due (10 am)	<b>23</b>	<b>24</b>	<b>25</b> CHRISTMAS	<b>26</b>
<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>		

**2009**