

# Physical Chemistry for Life Sciences Syllabus (Fall 2005)

## MW (1:00 pm – 1:50 pm) Bayer 103

## TTh (12:40 pm – 1:30 pm) Bayer 103

**Course Title:** *Physical Chemistry for Life Sciences*

**Instructor:** Dr. Jeffry D. Madura ([madura@duq.edu](mailto:madura@duq.edu))

**Office:** Mellon Hall, Room 308/320

**Office Hours:** MTWTh 2:00 – 3:00 p.m. or by appointment

**Textbook:** P. W. Atkins and J. de-Paula “*Physical Chemistry for the Life Sciences*” – Required.  
Robert Mortimer “*Mathematics for Physical Chemistry*” 2<sup>nd</sup> ed. – Recommended.  
Warren S. Warren “*The Physical Basis of Chemistry*” 2<sup>nd</sup> ed. – Recommended.

Sometimes it is helpful to see another author’s presentation of a subject, and the combined view can help in understanding the material.

I. Tinoco, Jr.; K. Sauer; J. C. Wang; J. D. Puglisi “*Physical Chemistry: Principles and Applications in Biological Sciences*”

Peter Atkins “*The Elements of Physical Chemistry: With Applications in Biology*”, W. H. Freeman, 2000.

Raymond Chang “*Physical Chemistry for the Chemical and Biological Sciences*”, University Science Books, 2000.

Raymond Chang “*Physical Chemistry for the Biosciences*”, University Science Books, 2005.

Peter R. Bergethon “*The Physical Basis of Biochemistry*” Springer-Verlag, 1998.

Kensal E. van Holde, Curtis Johnson, Pui Shing Ho “*Principles of Physical Biochemistry*”, Prentice-Hall, 1998.

**Class Objective:** Lecture material centers upon the fundamental concepts in physical chemistry. Students are expected to master ideas and concepts from Chapters 1-14. The material to be covered includes basic thermodynamics, physical and chemical equilibria, kinetics, electrochemistry, basic quantum mechanics, chemical bonding and reactivity, and fundamental molecular spectroscopy. The class objective is to establish a strong foundation in physical chemistry, which prepares students for upper level chemistry courses and laboratories.

**Honor Code:** This is a class for B.A. Biochemistry or equivalent students who plan to take only one-semester of physical chemistry. I expect each student to behave with the utmost maturity and integrity. All students are responsible for reading, understanding, and upholding the “Code of Student Rights, Responsibilities and Conduct.” and the BSNES academic integrity policy which is located at <http://www.science.duq.edu/academicintegrity.htm>. Violations of academic integrity include (but are not limited to): giving or receiving assistance or using unauthorized material as a test aid, attempting to alter a score or grade recorded on an exam or quiz by the instructor, submitting any document, e.g. lab report, essay or assignment that contains sentences or paragraphs that have been directly copied from another source (ie: textbook or student), attempting to adjust a score on a graded paper or test, and changing answers on a graded exam and submitting the exam for a regrade. Procedures for dealing

with infractions of the Code, including provisions for appeals, are printed in the text of “The Student Handbook and Code of Student Rights, Responsibilities and Conduct.” If anyone is caught violating the academic integrity policy, they will automatically receive a grade of “F” for the entire course, and will be referred to the Office of the Dean for further action.

- Class Rules:**
- (1) Class starts at 1:00 pm MWF; 12:40 pm TTh; be on time.
  - (2) Do not prepare to leave until class is over.
  - (3) No sleeping, eating or conversation while in class.
  - (4) Beepers, and cell phones are not allowed in class.

**Grading:** Your grade for this course will be based on **four** examinations, and **one** comprehensive Final examination. The weighting of each is given below

Three Exams (100 pts each)	300
Final Exam (2 hours)	200
Quizzes/Homework	140
Classroom Participation	100

Your final grade is based on the total points you earn and there is no pre-set fraction of the class that receives each letter grade. Experience has shown that a certain minimum performance is required to succeed in further work for which this course is a prerequisite. This level sets the passing grade, and the further you are above this level, the better your grade.

While individual exams may vary in relative difficulty, experience with our classes in the past has shown that averages in the sixty range will earn a student a grade of D, averages in the seventy range will earn a C, averages in the eighty range will earn a B, and averages above ninety will earn a grade of A.

The following formula can be used to determine your course average:

$$\% = \{[(\text{exam pts}) + (\text{final exam pts}) + (\text{quiz pts}) + (\text{participation pts})] / 740\} \times 100\%$$

**Exams:** Attendance is mandatory for all exams. Four (4) exams are tentatively scheduled. These exams will be cumulative but will primarily test material that has been covered since the previous exam. Exams will most likely contain multiple-choice questions, fill in the blank and word problems. The **Final Exam** will cover all material since the first class through the last class. **No exam make-ups or re-grades!!**

**Quizzes:** There will be unannounced, as well as announced, in class quizzes throughout the semester.

**Homework:** Several homework assignments will be assigned, collected and graded during the semester. **There will be no make-up or re-grades to the homework assignments.** The following instructions must be done in order to have any problem graded. If these instructions are not obeyed then the problem will not be graded and zero credit be given.

- Each problem must start on a new sheet of paper.
- The problem must be clearly and neatly worked out with sufficient detail describing what you have done.
- The answer must be clearly identified by highlighting it with a yellow marker.
- All pages of the homework need to be numbered starting with 1 and ending with the last page numbered.

**BlackBoard:** I will use BlackBoard in this class as a mechanism for posting announcements, notes, papers, solutions to assignments, and grades. You are responsible for knowing how to access BlackBoard and using it. If you have any questions about BlackBoard please see me.

**PRS:** The personal response system will be used in this class as a tool to provide dynamic assessment of your understanding of the various concepts you are to learn this semester. You will be responsible for the purchase of a keypad and it is your responsibility to bring the keypad to every class. Although no points are allocated in the determination of your course grade, how you respond will be used in making a grade assignment if you are on the border.

**Calculator:** This class is a mathematics based course. I recommend that you make use of CAS (Computer Algebra System) based calculator to assist you in solving many of the problems we will encounter throughout the semester. I have found that the TI-89 series of calculators will do most of the calculations and manipulation that we will do in this class. There are other calculators that can do the same thing and you are welcome to use them. It is important that you know the operation of your calculator so that you can make efficient use of it on your homework and during an examination. Periodically I will provide examples in class on how to use the TI-89 calculator to solve various problems. I may or may not know how to use other types.

**Disability:** Any student with a qualified disability that requires accommodation should inform the instructor as soon as possible so that arrangements can be made.

## Tentative Lecture and Examination Schedule

# August 2005

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22 Lecture 0	23 Ch 1 Lecture 1	24 Ch 1 Lecture 2	25 Ch 1 Lecture 3	26	27
28	29 No Class	30 No Class	31 No Class			

# September 2004

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
				1 No Class	2	3
4	5 Holiday No Class	6 Ch 2 Lecture 4	7 No Class	8 No Class	9	10
11	12 Ch 2 Lecture 5	13 Ch 2 Lecture 6	14 Ch 3 Lecture 7	15 Ch 3 Lecture 8	16	17
18	19 Ch 3 Lecture 10	20 Ch 4 Lecture 11	21 Ch 4 Lecture 12	22 Ch 4 Lecture 13	23	24
25	26 Exam I	27 Ch 5 Lecture 14	28 Ch 5 Lecture 15	29 Ch 5 Lecture 16	30	

# October 2004

SUNDAY      MONDAY      TUESDAY      WEDNESDAY      THURSDAY      FRIDAY      SATURDAY

						1
2	3 Ch 6 Lecture 17	4 Ch 6 Lecture 18	5 Ch 6 Lecture 19	6 No Class	7	8
9	10 Ch 7 Lecture 20	11 Ch 7 Lecture 21	12 Ch 7 Lecture 22	13 Ch 8 Lecture 23	14	15
16	17 Ch 8 Lecture 24	18 Ch 8 Lecture 25	19 Ch 9 Lecture 26	20 Ch 9 Lecture 27	21	22
23	24 Exam II	25 Ch 9 Lecture 28	26 Ch 10 Lecture 29	27 Ch 10 Lecture 30	28	29
30	31 Ch 10 Lecture 31					

# November 2004

SUNDAY      MONDAY      TUESDAY      WEDNESDAY      THURSDAY      FRIDAY      SATURDAY

		1 Holiday No Class	2 Ch 11 Lecture 32	3 Ch 11 Lecture 33	4	5
6	7 Ch 11 Lecture 34	8 Ch 12 Lecture 35	9 Ch 12 Lecture 36	10 Ch 12 Lecture 37	11	12
13	14 Ch 13 Lecture 38	15 Ch 13 Lecture 39	16 Ch 13 Lecture 40	17 Exam III	18	19
20	21 Holiday No Class	22 Holiday No Class	23 Holiday No Class	24 Holiday No Class	25 Holiday No Class	26
27	28 Ch 14 Lecture 41	29 Ch 14 Lecture 42	30 No Class			

# December 2004

SUNDAY

MONDAY

TUESDAY

WEDNESDAY

THURSDAY

FRIDAY

SATURDAY

				<b>1 No Class</b>	<b>2</b>	<b>3</b>
<b>4</b>	<b>5 Ch 14 Lecture 43</b>	<b>6 Review Last Class</b>	<b>7</b>	<b>8 Holiday No Class</b>	<b>9</b>	<b>10</b>
<b>11</b>	<b>12</b>	<b>13</b>	<b>14 1:15 – 3:15 FINAL EXAM</b>	<b>15</b>	<b>16</b>	<b>17</b>
<b>18</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>	<b>24</b>
<b>25</b>	<b>26</b>	<b>27</b>	<b>28</b>	<b>29</b>	<b>30</b>	<b>31</b>

I will follow this schedule as time and the class situation allows. Do realize, however, that occasionally it will take a bit longer than the schedule indicates for us to fully cover a particular topic. If this situation does arise, *you should still endeavor to keep up the reading assignments listed above.*