Syllabus for CHEM 3730 / 3710
Physical Chemistry Fall 2020

Tentative

Instructor: E.W. Findsen
Lectures: M,W,F 1:00 - 1:50 pm
Office Hours: M,W,F
Text: D. McQuarrie & J. Simon “Physical Chemistry” 1st Ed. 2nd printing.
Optional: Smath Studio.
Credit Hours: 3
Sections: 001, 091

Recitation (Optional) CHEM 3712/3732 Monday: 2:30 pm - 3:25 pm
Memorial Field House 1100

SPECIAL COURSE EXPECTATIONS DURING COVID-19

ATTENDANCE:
The University of Toledo has a missed class policy. It is important that students and instructors discuss attendance requirements for the course. Students must perform a daily health assessment, based on CDC guidelines, before coming to campus each day, which included taking their temperature. Absences due to COVID-19 quarantine or isolation requirements are considered excused absences. These absences may not require written notice.

FACE COVERINGS
All students must wear face coverings while on campus, except while eating, alone in an enclosed space, or outdoors practicing social distancing. NO students will be permitted in class without a face covering. If you have a medical reason that prevents you from wearing a face covering due to a health condition deemed high-risk for COVID-19 by the Centers for Disease Control and Prevention (CDC), you should submit a request for an accommodation through the Student Disability Services Office (SDS) by completing the online application. Students will need to provide documentation that verifies their health condition or disability and supports the need for accommodations. If a student is already affiliated with SDS and would like to request additional accommodations due to the impact of COVID-19, should contact their accessibility specialist to discuss their specific needs.

SOCIAL DISTANCING
Students should practice social distancing inside and outside the classroom please follow signage and pay attention to the seating arrangements. Do not remove stickers or tape from seats and/or tables, this is there to provide guidance on the appropriate classroom capacity based on the recommended 6 feet of social distancing between individuals. Please be conscious of your personal space and respectful of others. Also be cognizant of how you enter and exit the room; always try to maintain at least 6 feet of distance between yourself and others.

DESKS AND WORK SPACES
Students will need to sanitize their desks and/or work space before class with the University provided sanitizing spray and paper towels their desks.

SPECIAL NOTES
It’s important to note that based on the unpredictability of the COVID-19 virus things can change at any time so please be patience and understanding as we move through the semester. I also ask that you keep me informed of concerns you may have about class, completing course work/assignments timely and/or health concerns related to COVID.

COVID Policies: University guidelines require the following:
1) Masks must be worn in classrooms when entering
2) Students are required to sit in assigned seats
3) Office hours will be online.
4) Exams (quizams) will be online. Details will be made available at a later date

Course Catalog Description: Fundamental theories and basic laws of chemistry with emphasis on their mathematical development. Thermodynamics, equilibrium, electrochemistry, classical chemical kinetics

Prerequisites: Passing grades (as defined in the UT course catalog for your year of admission) in the following courses:
CHEM 2420, CHEM 2470 OR CHEM 2490, MATH 2850, PHYS 2140
**Course Description:**
This course is designed to investigate in detail the physical principles upon which chemistry is based and study their application to examples from chemical and biochemical systems. This semester will be focused on Thermodynamics, Equilibria, Electrochemistry and Kinetics. Applications of course topics to real systems (biological and industrial) are potential topics for class discussion.

**Course Outcome:** A more thorough understanding of the principles of physical chemistry and how they apply to all aspects of chemistry.

**Technology Requirements:** Access to a computer that has Excel installed.

**UNIVERSITY POLICIES**
*The University is an equal opportunity educational institution. Please read The University’s Policy Statement on Nondiscrimination on the Basis of Disability Americans with Disability Act Compliance.*

*The University of Toledo is committed to providing equal access to education for all students. If you have a documented disability or you believe you have a disability and would like information regarding academic accommodations/adjustments in this course please contact the Student Disability Services Office."

**Grades:**
There will be four “quizams” during the semester. Each will be worth 50 points. They will be one hour long and given online with a possibility of one or two being take home quizams with a longer deadline. Problems will be assigned for each chapter which will provide experience in applying and working with the concepts in each chapter.

Problems are assigned for each chapter which will provide experience in applying and working with the concepts in each chapter. They may be collected at a time announced in class. Four bonus points will be given per completed problem set. **The problem sets turned in will not be returned, so make copies if you wish a record.** The solutions must indicate that you have worked independently from the text. If you work with other students, you must be able to explain the steps taken to solve the problems. Copying the answer book is not allowed and will result in a grade of zero for the assignment. Copying another student is not allowed and will result in a grade of zero for the assignment for both students. Other than that, these will not be graded or scored. I will post the answer key for the assigned problems on line in the web site associated with this course thru Distance Learning after class on the day the problems are due. The answer keys will be print outs of MATH-CAD or S MathStudio worksheets.

You are encouraged to use SMath Studio in this course. It is a mathematics program which will be very useful in CHEM 3740 and in CHEM 3860/3870 (Advanced Laboratory I & II) and CHEM 3730. It will be referred to and used quite extensively in the recitation section(optional) of this course (although the software is not required). It has the potential to become very useful when you leave school. It will certainly help you with the mathematical aspects of this course. A link to the website for the software is provided on the course website. It has a few quirks but this software along with Excel will serve you well in this course.

Changes in scheduled quizam days will be announced at least 2 lectures prior to the change and placed on the course website.
Grade Sources:

<table>
<thead>
<tr>
<th>Source</th>
<th>Value</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizams 4</td>
<td></td>
<td>50 pts./ea @ 200 pts.</td>
</tr>
<tr>
<td>Final exam</td>
<td>1</td>
<td>200 pts. @ 200 pts.</td>
</tr>
<tr>
<td>Class participation &amp; projects</td>
<td>1</td>
<td>20 pts. @ 20 pts.</td>
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<tr>
<td>Total</td>
<td></td>
<td>420 pts.</td>
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</table>

Bonus:

<table>
<thead>
<tr>
<th>Bonus</th>
<th>Value</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Homework &amp;/or plots**</td>
<td>max. 4 pts/ plot</td>
<td>20 (Bonus points)</td>
</tr>
</tbody>
</table>

Grade scale will be 90% and above A, 86-89% A-, 85-83% B+, 84-80% B, etc. Scaling may be applied at the end of course.

***Some notes:

I have found that graphing data is an excellent way to visualize trends and concepts. I will give 4 pts. for graphs made (individually) of data presented in the text (for example(only), boiling pts. of Nobel gases vs atomic mass; at. radius vs. at. mass etc.). You must turn in (by email only):

- the plot,
- a printout of the data or the spreadsheet file,
- a one paragraph explanation of what you see as the trend
- a short explanation/discussion of the cause of the phenomenon.

All parts that apply must be present to obtain credit. You must e-mail the work to me as an attachment, preferably as a pdf file. The email subject field must include the phrase **Extra credit plot**. Maximum of 20 pts. total for semester. All materials must be a result of your own work. The last day I will accept this work will be 28 Nov. 2020 at 6:00 pm. This work may be completed using Smath Studio or Excel. Work must be submitted by email.

Recitation: CHEM3732 / 3712. Optional. P/NC course which will be used to discuss assigned problems and provide assistance in learning to utilize S MathStudio.
Tentative Schedule.

Subject to change by the instructor. Any changes will be announced in class and on the DL web site for this course. **YOU are responsible for knowing these changes.**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter 2nd printing</th>
<th>Chapter 1st printing</th>
<th>Problems</th>
</tr>
</thead>
<tbody>
<tr>
<td>17-Aug</td>
<td>Background, The Properties of Gases</td>
<td>notes, 16</td>
<td>16</td>
<td>TBA</td>
</tr>
<tr>
<td>24-Aug</td>
<td>The Properties of Gases</td>
<td>16, 27</td>
<td>16/25</td>
<td>TBA</td>
</tr>
<tr>
<td>31-Aug</td>
<td>The Kinetic Theory of Gases</td>
<td>27</td>
<td>25</td>
<td>TBA</td>
</tr>
<tr>
<td>7-Sep</td>
<td>The First Law of Thermodynamics</td>
<td>19</td>
<td>19</td>
<td>TBA</td>
</tr>
<tr>
<td>14-Sep</td>
<td>The First Law of Thermodynamics</td>
<td>19</td>
<td>19</td>
<td>TBA</td>
</tr>
<tr>
<td>28-Sep</td>
<td>Entropy and the Second Law of Thermodynamics</td>
<td>20</td>
<td>20</td>
<td>TBA</td>
</tr>
<tr>
<td>5-Oct</td>
<td>Entropy and the Second Law of Thermodynamics</td>
<td>20</td>
<td>20</td>
<td>TBA</td>
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<tr>
<td>12-Oct</td>
<td>Entropy and the Third Law of Thermodynamics</td>
<td>21</td>
<td>21</td>
<td>TBA</td>
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<tr>
<td>19-Oct</td>
<td>Entropy and the Third Law of Thermodynamics</td>
<td>21</td>
<td>21</td>
<td>TBA</td>
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<tr>
<td>26-Oct</td>
<td>Helmholtz and Gibbs Energies</td>
<td>22</td>
<td>22</td>
<td>TBA</td>
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<tr>
<td>2-Nov</td>
<td>Phase Equilibria</td>
<td>23</td>
<td>23</td>
<td>TBA</td>
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<tr>
<td>9-Nov</td>
<td>Solutions I: Liquid-Liquid Solutions</td>
<td>24</td>
<td>NEC</td>
<td>TBA</td>
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<tr>
<td>16-Nov</td>
<td>Solutions II: Solid-Liquid Solutions</td>
<td>25</td>
<td>NEC</td>
<td>TBA</td>
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<tr>
<td>23-Nov</td>
<td>Chemical Equilibrium Quiz Wednesday</td>
<td>26</td>
<td>24</td>
<td>TBA</td>
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<tr>
<td>2-Dec</td>
<td>Chemical Kinetics I: Rate Law -ONLINE-</td>
<td>28</td>
<td>26</td>
<td>TBA</td>
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<tr>
<td>TBA</td>
<td>Final Online</td>
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NEC = No Equivalent Chapter

TBA To Be Announced

Some websites of interest (checked on 02 August 2019):

http://webbook.nist.gov/
https://ptable.com/
http://www.iupac.org

If the link below is copied and pasted into your browser it should take you to the document on units in Phys. Chem.