

Advanced Laboratory II Spring 2021 TENTATIVE

INSTRUCTOR: Dr. Eric W. Findsen
OFFICE: WO 2278 (or BOL185)
Office Hours: Posted on Course Website

Class Laboratory: Sec 001 Tuesdays 8:30 AM BO 2047
 Tuesdays & Thursdays 8:30 AM - 11:20 AM BO 2097, 2095

 Sec 002 Tuesdays 2:30 PM BO 2047
 Tuesdays & Thursdays 2:30 PM - 5:20 PM BO 2097, 209

Location: BO 2097, 2095
Credit Hours: 2.0

Pre-requisites : **Chemistry** 3710 or 3720 and 3860 Math 1860, Physics 2140
Co-requisites: **Chemistry** 3720 or 3740

Course Catalog Description: Laboratory experiments and techniques relating to subjects developed in CHEM 3720, or 3740.

Technology Requirements: Access to computer with word processing and spreadsheet software, USB Flash drive at least 1 GB capacity.

Course Objective: The purpose of this laboratory course is to place in a practical light, concepts presented in the physical chemistry lecture series. These principles are fundamental to the understanding and application of chemistry in its various guises. This is a very demanding course with respect to time and effort. **As with any course, what you learn from this experience is directly related to the effort you put into this course.** This course should not be viewed as a chore or something to be tolerated. People with this type of attitude will most likely not do well and will learn little.

University Policies: *Policy Statement on Non-Discrimination on the basis of Disability (ADA) 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](#).

TEXT: "Experiments in Physical Chemistry", Garland, Nibler, and Shoemaker; 8th edition (any addition after the 6th will work).

A standard laboratory notebook (with duplicate pages) is required for observations and experimental data. You must turn in legible duplicates of your notebook pages with your report.

This is a Blackboard assisted course. There is a specific Blackboard site for this course containing all documents supplied by the instructor. You are expected to check this site no later than the night before the lab meets for any changes or additional lab related announcements.

Additional: Students are expected to have access to a computer, Microsoft Word, Microsoft Excel, and Mathcad(Prime) or Smath Studio. If you do not have access to a word processor you can download Microsoft compatible freeware word processor and spreadsheet software from Open Office . You have

access to online journals through the electronic subscriptions available on campus through Carlson Library. See your instructor or TA or a member of the library staff for assistance.

Note: in general, electronic journal subscriptions must be accessed through the University web servers. Mathcad(Prime) is also available for free with limited functionality (should be everything you would use for this course) from the PTC website(<http://www.ptc.com/product/mathcad/download-free-trial>) There is also freeware software that is basically the equivalent of Mathcad. It is called Smath Studio and a link to the download sites is located on the course website.

It is recommended that students read :

"Writing the Laboratory Notebook", H.M. Kanare, American Chemical Society.
And references supplied on the course website.

Instrument operating manuals and supplementary material for laboratories in this course are available online in the course website. You are expected to read them before operating the instruments.

Electronic devices such as tablets, net books and laptops are not acceptable substitutes for a paper laboratory notebook. They are not to be used in the laboratory environment. The risk of chemical contamination is severe. Further, cell phones are not to out or left on the bench. If there is a need, you must clear use with the instructor, every lab period.

GRADES: Grades will be based upon;

Technical Reports (9 x 100 pts. Each)	900 pts.
Prelab Reports (9 x 20 pts. Each)	180 pts.
<u>Lab technique evaluation</u>	<u>100 pts.</u>
Total	1180 pts.

Plan on a straight scale i.e. > 90% = A; 87-89 % = A- etc.

Failure to turn in a lab report for each experiment will automatically result in a grade of F for the course.

Plagiarism in any form can result in the award of zero for that specific prelab and the report. After the award of the grade of zero for a prelab and report, a repeat of the offense will result in the award of a grade of F for the entire course.

Plagiarism is partially defined in The University of Toledo's policy on Academic Dishonesty. This definition is extended to include (this list is not inclusive); obtaining past reports and copying the text or information in them, copying and using reports/ information posted on the internet, copying or paraphrasing texts' or articles, any behavior which is deemed by the instructor to fit within the University of Toledo's policy on Academic Dishonesty.

SCHEDULE: Experiments will be performed on a rotating group basis. Students will work in pairs, each individual recording results and observations independently. Each person will be responsible for reading and comprehending on his or her own; chapters I, II, III, XVI, XVII, XVIII, XIX, XX, XXI, and XXII.

NOTE: Class will meet in BO 2835 at 8:30 AM (sec 001) on Tuesdays for lab related announcements. **Attendance is required. Be on time.** Failure to attend can result in the student being dropped from the course and given a grade of F.

Supplementary Materials: If supplementary materials are made available to the student (including supplementary data), it is the students responsibility to obtain these materials from the instructor individually or, online if available.

Before you will be allowed to start working, you will be quizzed orally or using a written quiz (instructor privilege) on the experiment you are performing. You must be prepared to answer the following questions (verbally) regarding the experiment you are going to work on.
Failing the quiz will result in either a delay in starting the lab or ejection from the laboratory.

If you cannot answer the following questions orally/written out, you will not be allowed to start work.

- 1) What is the goal of the experiment?
- 2) What is/are the experimental observable(s)?
- 3) How does one get from the experimental observable to the goal of the experiment?
- 4) Put simply, what is the theory behind the experiment ?
- 5) What new techniques are used in the experiment?
- 6) What experimental or environmental factors must be controlled or recorded?
- 7) Safety concerns for the experiment.
 - A) Relative toxicity of reactants, products and solvents.
 - B) Reactivity of reactants, products and solvents
 - C) Routes of exposure.
 - D) Symptoms of exposure.
 - E) Waste disposal.
 - F) Safety with respect to instrumentation or apparatus used in the experiment.

A chemical hazards form must be completed for every chemical used in an experiment. It can be used when answering the safety questions above. Chemicals used in different experiments only need be written up once but do reference them in each experiment prelab.

PRELABS:

Prelabs are due the Saturday before the start of the experiment at 10 PM. They will be turned in electronically using the prelab links on the course web page. If the prelab or a student's response to the oral examination are deemed inadequate the student(s) will not be allowed to start work. Your prelab will be collected for inspection during or after the oral examination. **A chemical hazard form for each chemical used, or produced* in the experiment must be turned in before the student can start work. The student's verbal responses and written component will determine the value of the multiplier to be used in determining the score for the experiment.**
***only concerned with known/expected products of the reaction(s).**

POST EXPERIMENT ANALYSIS:

The computers in the Physical Chemistry Laboratory will be available for use in analyzing your experimental results. They will be available outside of class by appointment and/or during other lab section meeting times with members of the section in session having priority.

Lab Reports:

Post lab documentation will be due ten days after scheduled completion of the lab by the student (Sundays 11:59 PM).

Late lab documents will not be accepted unless;

- 1) prior permission is given by the faculty member(Prof. Findsen) **in writing.**
- 2) documentation is provided that the student was incapacitated according to University of Toledo Criteria.

If approved, the email that conveys approval of the extension must be submitted with the report.

The T.A. does not have the authority to grant extensions for report deadlines. If not approved by the instructor, late reports will be given a score of 0. These requests must be addressed to the faculty member(EWF). Bear in mind that there are very, very few acceptable justifications for an extension of the due date.

A late report must be submitted with a copy of the email giving permission. Failure to do this will result in a grade of zero.

Lab reports are to be turned in electronically using the course website. Reports can be turned in, in sections if necessary. Be sure to List all sections of the report document if the report is uploaded in sections on the first page of the main report body if this is done. **Lab reports are due SUNDAYS 11:59 PM ten days from the date of completion on the prior Thursday.**

LABORATORY SCHEDULING: There are two experiments which require the use of NMR instruments. **You must be in lab on time and prepared to work when lab starts.**

Documents detailing prelab and report criteria are available on the course website.

Advanced Laboratory II Spring 2020

Lecture:	Lab Background	Week 1
6. SDRD	Solvent dependence of the spectrum of Riechardt's dye	handout
1 ASCD	Absorption Spectrum of Conjugated Dyes	34 & handout
2 FQA	Fluorescence Quenching of Acridine Ions in SDS micelles.	handout
3. PXR	Powder X-ray diffraction study (NaCl)	46
4. STPP	Synthesis H ₂ TPP and either Zn, Cu, or Fe TPP	handout
5 RBDMA	NMR determination of the rotational barrier of DMA	handout & Theory (only) 42
7. HCl/DCl	Part I. Synthesis and Rotational Spectra of HCl/DCL Part II. Calculation of Spectral Features	37 & handout (procedure in handout)
8. FDP	Rotational Time Correlation Measurement Using Fluorescence Depolarization Studies***	handout
9. METCHL	Synthesis, Isolation, and Spectral Characterization of Metal Chelates mag. suscept.. (Gouy, NMR), UV/Vis possibly 41	handout, 32, 33,

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Students are responsible for writing a procedure based upon literature references. This must be submitted to the instructor **on Monday @ 10 PM 3 weeks before the experiment** is to be started.

For experiments with References that are from ACS journals are not supplied. You can access those online using computers on the UT campus.

{Procedure Due Date}

week	Date	Group 1	Group 2	Group 3	Group 4
1	Jan 19-21	Lecture			
2	Jan 26-28	6. SDRD	6. SDRD	6. SDRD	6. SDRD
3	Feb 2-4	5 RBDMA	1 ASCD	2 FQA	3. PXR
4	Feb 9-11	1 ASCD	2 FQA	2 FQA	1 ASCD
5	Feb 16-18	Instructional Break Tuesday Only			
6	Feb 23-25	2 FQA	2 FQA	3. PXR	5 RBDMA
7	Mar 2-4	2 FQA	3. PXR	5 RBDMA	2 FQA
8	Mar 9-11	3. PXR	9. METCHL	1 ASCD	2 FQA
9	Mar 16-17	7. HCl/DCl	9. METCHL	8. FDP	9. METCHL
10	Mar 23-25	9. METCHL	5 RBDMA	4. STPP	9. METCHL
11	Mar 30- Apr 1	9. METCHL	7. HCl/DCl	4. STPP	4. STPP
12	Apr 6-8	4. STPP	8. FDP	9. METCHL	4. STPP
13	Apr 13-14	4. STPP	4. STPP	9. METCHL	8. FDP
14	Apr 20-22	8. FDP	4. STPP	7. HCl/DCl	7. HCl/DCl
15	Apr 27-29	Last Week			
16	May 4-6	Finals Week			

Due Date Calendar

week	Date	Group 1	Group 2	Group 3	Group 4	Group 5
1	Jan 19-21	Lecture				
2	Jan 26-28	6. SDRD	6. SDRD	6. SDRD	6. SDRD	6. SDRD
3	Feb 2-4	5 RBDMA	1 ASCD	2 FQA	3. PXRD	1 ASCD
4	Feb 9-11	1 ASCD	2 FQA	2 FQA	1 ASCD	4. STPP
5	Feb 16-18	Instructional Break Tuesday Only				
6	Feb 23-25	2 FQA	2 FQA	3. PXRD	5 RBDMA	4. STPP
7	Mar 2-4	2 FQA	3. PXRD	5 RBDMA	2 FQA	9. METCHL
8	Mar 9-11	3. PXRD	9. METCHL	1 ASCD	2 FQA	9. METCHL
9	Mar 16-17	7. HCI/DCI	9. METCHL	8. FDP	9. METCHL	5 RBDMA
10	Mar 23-25	9. METCHL	5 RBDMA	4. STPP	9. METCHL	7. HCI/DCI
11	Mar 30- Apr 1	9. METCHL	7. HCI/DCI	4. STPP	4. STPP	2 FQA
12	Apr 6-8	4. STPP	8. FDP	9. METCHL	4. STPP	2 FQA
13	Apr 13-14	4. STPP	4. STPP	9. METCHL	8. FDP	8. FDP
14	Apr 20-22	8. FDP	4. STPP	7. HCI/DCI	7. HCI/DCI	3. PXRD
15	Apr 27-29	Last Week				
16	May 4-6	Finals Week				

This sheet must be turned into the instructor (not the TA) before you can start the first experiment.

I have read the University of Toledo's policy on Academic Dishonesty and I understand that failure to follow those rules will result in the following penalties;

The first act of plagiarism, in any form, can result in the award of zero for that specific prelab and the report. After the award of the grade of zero for a prelab and report, a repeat of the offense will result in the award of a grade of F for the entire course.

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I further understand that I will be subjected to an oral and/or possibly written quiz to assure I have prepared for the lab exercise I am scheduled to perform. I understand that I will not be allowed to start until I can prove that I have understanding, at the level expected by the Instructor, of the experiment procedure, health risks and operation of the instrumentation used in the experiment. I understand if I am not allowed to start because I, or my partner, are not prepared, that it will impact my grade (and my partners) in a negative manner.

I also understand that the safety of myself and others is, in part, my responsibility and I will work following the safety rules provided by the instructor and the Dept. of Chemistry. If I notice anything I believe to be unsafe, either an experimental setup or the actions of a class member, I will bring it to the attention of the T.A. or instructor immediately.

I also will not share or make available in anyway to other students my: report, spreadsheet, or Mathcad files. This includes any calculations made by hand.

Signed : _____

Date: _____

Print Name: _____

I am currently enrolled in, or successfully completed (C- or better) one of the following courses:

_____ CHEM3730 Physical Chemistry I

_____ CHEM3740 Physical Chemistry II

I successfully completed (C- or better)

_____ CHEM3860