

## I. Instructor's Schedule

	Monday	Tuesday	Wednesday	Thursday	Friday	
08:00	105-01L1 PRAG Lab B140	<b>105-01 Lect A121</b>	105-01L2 PRAG Lab B140	<b>105-01 Lect A121</b>	<b>105-01 Lect A121</b>	
09:00	105-01L1 PRAG Lab B140	<b>Prep</b>	105-01L2 PRAG Lab B140	<b>Prep</b>	<b>Prep</b>	
10:00	105-01L1 PRAG Lab B140	<b>333-01 Lect A111</b>	105-01L2 PRAG Lab B140	<b>333-01 Lect A111</b>	<b>333-01 Lect A111</b>	
11:00	<b>105-01L3 Lab B140</b>	<b>Prep</b>	<b>PRAG</b>	<b>PRAG</b>	<b>PRAG</b>	
12:00	<b>105-01L3 Lab B140</b>	<b>105-01D1 Disc A112</b>	<b>PRAG</b>	<b>PRAG</b>	<b>PRAG</b>	
13:00	<b>105-01L3 Lab B140</b>	<b>Prep</b>	<b>PRAG</b>	<b>PRAG</b>	<b>PRAG</b>	
14:00	105-01L4 Lab B140	335-01L1 Lab C141	<b>105-01D2 Disc A112</b>	335-01L2 Lab C141	<b>PRAG</b>	<b>Meeting or Seminar</b>
15:00	105-01L4 Lab B140	335-01L1 Lab C141	<b>105-01D3 Disc A112</b>	335-01L2 Lab C141	<b>PRAG</b>	<b>PRAG</b>
16:00	105-01L4 Lab B140	335-01L1 Lab C141	<b>105-01D4 Disc A112</b>	335-01L2 Lab C141	<b>PRAG</b>	<b>PRAG</b>

PRAG = Projects, Research, Appointments or Grading

---

## II. Course Description and Learning Outcomes

**Chem 333.** Biophysical Chemistry. 3 cr. Examine physiochemical principles underlying structure and chemical properties of macromolecules of biological importance, including principles of thermodynamics, equilibrium, kinetics, and dynamics. Includes methods for separation and isolation of macromolecules and their spectroscopic characterization. 3 hrs lec per wk. Prereq: Math 120, Physics 204 or 250, Chem 365, and accepted biochemistry major or cons chair.

## Learning Outcomes:

The learning outcomes for Chem 333 are derived from the learning outcomes for Majors in the Department of Chemistry and from the Communication in the Major (CitM) component of the General Education Program. The Chemistry Department has eight learning outcomes; three of them:

1. apply the foundational principles of chemistry (conservation of matter, the laws of thermodynamics, the principles of phenomenological and mechanistic kinetics, and models for the electronic structure of atoms and molecules) to explain the chemical and physical properties of matter;
4. search the chemical literature for information relevant to a project of interest utilizing modern methods;
6. communicate experimental results and chemistry related issues as a written report, as a poster, and as an oral presentation. Students will be able to work in teams to perform laboratory work and report on this work.

are addressed, at least in part, in Chem 333. To be more specific, students in Chem 333 will:

- a. apply the foundational principles of chemistry (conservation of matter, the laws of thermodynamics, the principles of phenomenological and mechanistic kinetics, and models for the electronic structure of atoms and molecules) to explain the chemical and physical properties of matter;
- b. search the chemical literature for information relevant to a project of interest utilizing modern methods;
- c. communicate experimental results and chemistry related issues as a written report and as an oral presentation.

Since Chem 333 is a lecture only course, students will use simulated experimental results in a written paper and as the basis for an oral presentation.

Communication in the Major has two learning outcomes. Both of them are addressed in Chem 333 and they are listed below.

1. Apply discipline-specific standards of oral and written communication to compose an articulate, grammatically correct, and organized presentation/piece of writing with properly documented and supported ideas, evidence, and information suitable to the topic, purpose, and audience.
2. Critique their own and others' writing/oral presentations to provide effective and useful feedback to improve their communication.

To achieve these outcomes, students will:

- i. attend lectures in which the laws of thermodynamics are introduced in the form of differentials and then applied to chemically relevant situations (properties of substances, conversion of thermal and chemical energy into other usable forms of energy such as electrical energy, phase diagrams, chemical reactions),
- ii. attend lectures covering topics in chemical kinetics (kinetic theory of gases, initial rate laws, integrated rate laws, reaction mechanisms, discrete and continuous dosing),
- iii. attend lectures covering elementary quantum mechanics and its application to spectroscopy,
- iv. attend lectures covering scientific writing,
- v. read a textbook that emphasizes physical chemical applications to biological sciences and illustrates scientific writing,
- vi. solve problems and answer questions that are based on lecture and course material,
- vii. examine writing samples, write detailed solutions to problems, prepare a report, and deliver a short talk, and
- viii. prepare a concise summary of each chapter to use as a "cheat sheet" during exams.

Students' achievement will be formally assessed through the grading of their exams, writing assignments, a chalk talk, and the cumulative final exam.

### III. Course Schedule

Chemistry 333 covers the textbook chapters shown below. In many cases, only select topics will be covered from a chapter. A detailed reading list will be provided.

Three exams will be given during the semester. The exams will be given during the evening on the Tuesdays of the weeks shown below and will run from 6:00 to 8:00 PM; later starting times may be arranged to avoid conflicts. The regular class period will be a time for questions. All of the exams will be closed book, however, students are allowed to bring in an equation sheet (one 8.5" x 11" sheet of paper; both sides may be used) for each of the hour exams and for the final exam.

W	Chp	Notes	Chem Rev Problems Part (pages)
1	CitM / Rev		P1 (4-7), P2 (11)
2	Rev / 2		P4 (15-20, omit 21)
3	2 / 3		
4	3 / CitM		
5	4	Review / Ex 1	P4 (23-27)
6	4		
7	6		
8	5		
9	5	Review / Ex 2	
10	8 / 9		P4 (29-31)
11	9		
12	10	<b>Thanksgiving</b>	P1 (3)
13	10 / 11	Review / Ex 3	P1 (8-9), P3 (13-14)
14	11 / CitM Talks		
15	CitM Talks		

CitM = Communication in the Major

Rev = Review of math, physics, chemistry as appropriate

The schedule may be refined and/or modified as the semester progresses.

## IV. Principle Assignments

- Content:** A set of recommended problems will be handed out for each chapter. Some of the problems will be taken from the course textbook while others will come from other sources. You are expected to try the problems on your own before seeking assistance or looking at the solutions. Everyone is expected to understand how to work all of the problems. Answers and solutions will be provided. The questions and problems on the midterm exams and the final exam will also be based on these recommended problems.
- CitM:** There will be a variety of CitM-related activities and assignments (skill building, written solutions, chalk talk). The skill building and written solution assignments are designed so that students may resubmit them until they are judged to be satisfactory. Because of this, points are not awarded for completing the assignments. Instead, point penalties will be imposed for not reaching a satisfactory level or not submitting an assignment.
- Skills:** Several short assignments will be given early in the semester and they will focus on the structure of textbooks and journal articles as well as aspects of scientific writing involving equations, tables, graphs, and figures.
- WS:** There will be three assignments that involve writing a detailed solution to a fairly simple problem. The written solution should resemble the detailed worked examples in chemistry, physics, and mathematics textbooks. Since the emphasis of this assignment will be on the writing, the content will be at the level of chemistry problems from prerequisite courses.
- Chalk Talk:** Each student will present a short "chalk talk" near the end of the semester. The talks will be based on chemistry review problems, presented on a chalk/white board in front of a small group of other students and the instructor, and there will be a 5-7 minute time limit. A list of the potential problems will be distributed early in the semester so that students will have ample time to practice. Problem selection will be by a random draw on the day of the talk. Students are expected to plan/practice their talks and they must submit either a picture of a chalk/white or a sheet of paper (landscape orientation) showing their plan or the result of a practice.

## V. Evaluation

Three Midterm Exams (120 pts / exam)	360 pts
Comprehensive Final Exam	140 pts
<b>Total</b>	<b>500 pts</b>

- \* Midterm exams and the final exam will cover course content and some elements of CitM.
- \* Grades will be assigned according to the following scheme: 90.0-100%, A; 85.0-89.9%, A-; 80.0-84.9%, B+; 75.0-79.9%, B; 70.0-74.9%, B-; 65.0-69.9%, C+; 57.0-64.9%, C; 50.0-56.9%, D+; 45.0-49.9%, D; 44.9% and lower, F. I reserve the right to adjust the grading scheme to the benefit of the students.
- \* Incomplete or unacceptable CitM assignments will result in lost points (penalties).
- \* The score of the lowest of the three midterm exams will be replaced by scaled percentage of the final exam if the final exam percentage is higher. However, remember that the final exam is comprehensive.
- \* There are no *individualized* extra-credit opportunities in this course.

### Grading Rubrics:

**Midterm Exams and the Final Exam** - Point values for *questions and problems* are given on the exams. *Questions* are usually multiple choice or matching and are usually graded either zero or full credit. *Problems* have point values that are related to the number of steps needed to arrive at the answer. Points (usually 1 to 3) will be deducted for each independent error depending on the severity of the error. *Problems* that have two or more independent parts are graded as though they are separate problems.

### Communication in the Major (CitM)

**Skill Building Assignments** - Equation Editor, Equations in Sentences, Sentence Scrambles, Formatting Tables, Graphs, and Figures. A 2 pt penalty will be assessed for each assignment that isn't completed.

**Written Solutions** - The solutions will be judged either acceptable or unacceptable. Unacceptable solutions may be resubmitted. Note that the content of the problems will be at the level of general chemistry since these are primarily writing assignments. For each problem, a 10 pt penalty will be imposed for not submitting a solution and a 5 pt penalty will be imposed if the final submission is unacceptable.

**Short Talk (white or chalk board)** - The chalk talk will be judged acceptable or unacceptable. Students whose talk was not acceptable will meet with the instructor in small groups to do a second talk. A 10 pt penalty will be imposed for not presenting a talk; a 5 pt penalty will be imposed for each plan/practice item not submitted.

## VI. Student Conduct and Special Accommodations

UWSP policies concerning student academic standards and disciplinary procedures can be found in Section II of the UWSP **Community Bill Of Rights And Responsibilities**. This document is available on the UWSP Website.

If you need special accommodations for religious beliefs or learning disabilities, you should consult the appropriate offices and policies at UWSP and then see me as soon as possible so that we can make appropriate arrangements for your situation. UWSP's University Catalog has some information and it can direct you to other resources.

## VII. Bibliography

Lecture Text. Tinoco, Sauer, Wang, Puglisi, Harbison, Rovnyak, Physical Chemistry - Principles and Applications in Biological Sciences 5<sup>th</sup> ed., Pearson, New York, 2014.