C106 Fundamental Chemistry Syllabus & Policies for SPRING 2021

Instructor: Tony Timerman, Ph.D. (in Biochemistry, 1989)
Office: Room 414 Chemistry Biology Building (CBB)
Phone? As part of campus-wide cost-cutting efforts, I no longer have an office phone!
e-mail: ttimerma@uwsp.edu

INSTRUCTOR'S SCHEDULE

Time	Mon	Tue	Wed	Thr	Fri
8 AM		C106-02 Lab 1 CBB 230 40755B	C106-02 Lab 2 CBB 230 40757B		
9 AM					
10 AM					
11 AM					
(12 PM)	*** Office Hour		*** Office Hour	**C106 02D3	*** Office Hour
1 PM	*C106-02 Lecture/On-line		*C106-02 Lecture/On-line		**C106-02 Lecture/On-line
2 PM		C106-02 Lab 3 CBB 230 (Lawrence) 40759B		**C106 02D2	
3 PM				**C106 02D1	
4 PM					

*** LECTURES** consist of video recordings of PowerPoint presentations posted on the course Canvas page. In place of 3x 50 minute face to face lectures (2.5 hours/week), expect **FOUR to FIVE recording of 25 - 30 minutes each week**. It is each student's responsibility to keep up with ALL weekly "presentations" in a timely manner (do your best to not fall behind).

****DISCUSSIONS** will be conducted **synchronously on-line via zoom**. I will try to preview upcoming lab exercises & then review the solutions to lecture quizzes or mid-term exams. Any remaining time is an open-ended question & answer session.

******OFFICE Hours:*** Virtual Q & A sessions via Zoom open to all students. For solo-meetings, (face to face or via zoom), contact me **by email** to arrange meeting details.

Course Description:

Chemistry 106 is the second half of a college-level, two-semester sequence in **General Chemistry.** C106 serves as the gateway into upper level courses (C248 & C325) at UWSP and is evaluated in that context. Many concepts developed from in C105 will be applied in order to explore:

A) The properties of **liquids & aqueous solutions** (ideal gas behavior was explored in C105);
B) The **rates & pathways** between reactants vs. products of a balanced reaction (kinetics);
C) The nature of the **equilibrium states of a reaction in a closed system** with emphasis on both acid/base & precipitation reactions;
D) **Thermodynamics & work limitations** with applications in electrochemistry (such as cell phone batteries).

Prerequisites:

- **C105, Fundamental Chemistry** (or equivalent transfer credits) with a minimum grade of C minus.
- **M107, Algebra/Pre-Calculus:** Please note that, compared to C105, additional math skills from this pre-requisite will be applied in the second semester including (i) logarithmic & inverse-logarithm functions (base-10 & natural logs) and more applications of graphical analysis.

Required materials

- **Textbook:** Chemistry: Structure & Properties (2nd edition) by Nivaldo Tro (Available for rental from the bookstore).

- **Scientific Calculator** that enables you to accurately enter & convert both very large vs. small numbers from decimal to scientific notation as well as logarithms & anti-logarithms. The **TI-30XA** calculator is VERY inexpensive and performs well for ANY task needed in C105 & C106.

- **Lab Flow Registration:** The electronic LMS (learning management system) for online lab instructions/descriptive videos, prelab quizzes plus electron submission. You can register through the bookstore OR (with certain restrictions) directly from Lab Flow.

- **Lap-tops vs. Mobile Devices** (I-pads and other e-books): Each **mid-term exam** is electronically proctored via **HonorLock**. The application DOES NOT work with mobile devices (therefore a lap-top or PC is required for this task). Students have reported similar problems using mobile-devices (such as I-pads) in other on-line features (including videos and quizzes on Canvas and some features of the Labflow program).

- HIGHLY RECOMMENDED: A large three-ring binder AND a large quantity of loose leaf note-book paper. This is for storing and organizing hard-copies of all things related to this class: learning objectives for each chapter, the exam information sheet, and a record of your attempts at solving chemistry related problems (see "expectations" below).

Attendance & expectations of a 5-credit college chemistry course

- I do not take attendance! I do not collect, grade & assign points to homework exercises. *Yet I know that most students benefit from **active & engaged participation** in each & every component of the course. In this sense, attendance to all class meetings is mandatory.*

- **It is your responsibility to obtain all material & information posted on Canvas** and to keep up with BOTH the lecture & laboratory components of the class.

  E-MAIL: I keep in touch with my class via email (announcements on Canvas are very rare). Please check your email frequently for class updates. Make a folder on your device to save and store my emails for future reference.

- **When you start a new unit/chapter**, print a hard copy of the **Chapter Learning Objectives** (it is the first item in every Module on Canvas). *These objectives are designed to serve as a guide (or check-off list) for each unit of material.*

- **Everyone learns chemistry by solving problems!** *There is NO magic pill to circumvent this issue! You will make mistakes (we all do) & the goal is to learn from those mistakes. Therefore, the more problems you tackle, the more chemistry you learn.*

- **For a five-credit college chemistry course at 2-3 hours per credit,** *successful students will devote 10-15 hours per week in meeting the minimum expectations of the class:*
  - ✓ 4-5 hours per week on the lecture component
  - ✓ 3-4 hours on the laboratory requirement
  - ✓ 3-4 hours a week of reading the textbook, solving problems & checking your work.

  This adds up to a range of 10-13 hours per week (minimum).

Mid-term exam schedule (closed book exams proctored electronically via Honor-Lock)

Exam	Date, Time & Location	Points
Exam 1	Monday (of week 5) **February 22, 2021**. **Time: 1 to 9 PM** (Week 1-4 lecture Material)	200
Exam 2	Monday (of week 9) **March 29, 2021** (Monday after Spring Break) **Time: 1 to 9 PM** (Week 5-8 lecture material)	200
Exam 3	Monday (of week 13) **April 26. 2021**. **Time: 1 to 9 PM** (Week 9-12 lecture material)	200
Exam 4	Monday (of week 16) **May 17, 2021.** **Time: 9 AM to 9 PM** (Week 13-15 material)	200

Time: this refers to the **time-window** each exam will be open on the course Canvas page. The time-limit on each exam will be about 75 minutes. Each exam must be completed **before 9 PM**.

Make-up exams? NO MAKE-UP EXAMS are provided **without 24-hour advanced written notification** complete WITH verification for the excused absence!

Grading Scale:

At the end of the semester, letter grades will be based upon the percentage earned out of **ABOUT 1200 total points** according to the grading scale posted below: 1200 total points represents 4 midterm exams (800 points), 12 laboratory quizzes/exercises of 25 points (300 points), and 9-10 weekend check-in quizzes of 10 points each (90 – 100 total points).

Percentage of total points earned	Letter grade
Above 90 %	A
88-89 %	A-minus
86-87 %	B-plus
81 - 85 %	B
79 - 80 %	B-minus
77 -78 %	C-plus
72 - 76 %	C
68-71 %	C-minus
64-68 %	D
Below 64%	F

- I reserve the right **to lower** (**but will never increase)** the posted grading scale.
- Each 200-point mid-term exam has a built-in extra-credit value of 10 points (or 5%), such that a perfect score is (**eventually**) recorded as 210 out of 200 points.
- Each 10-point weekend quiz has a built-in extra-credit value of 2-points (20%), such that a perfect score is (**eventually**) recorded as 12 out of 10 points.
- Unlike mid-term exams, weekend quizzes are open-note & open-book with no electronic proctoring. Students have two chances on each quiz (with a time limit on each attempt). Your posted score is the average of the two attempts.

Rules for not meeting Minimum Expectations

- Because this is an on-line course in which you have a flexible schedule to meet all deadlines, failure to complete any assignment will have a negative impact on your grade.
- Failure to submit **two lab-reports** on Lab-Flow will impact your grade but not prevent you from passing the class.
- Failure to submit **three or more lab-reports** will result in an automatic fail (letter grade of F).

Electronic devices: Cell phones are not allowed to be used in place of a dedicated scientific calculator during **mid-term exams.** They are, however, okay & recommended while working on quizzes and lab exercises.

Technology issues: I am not an expert at solving problems with your devices and related software. If you are having an issue with your devices, I suggest contacting the UWSP information technology office. If you are having issues with videos and quizzes or other issues related to Canvas, contact CITL (Center of Inclusive Teaching and Learning)

Accommodations for disabilities: Students should contact the Office of Disability Services within the first two weeks of the semester to request and arrange necessary accommodations for exams and laboratory assignments.

Academic Responsibility All cases of academic dishonesty will be dealt with in accordance to the UWSP rules on academic misconduct as stated in Chapter 14 of the Rules and Regulations Governing the Faculty, Staff, and Students of UWSP (Community Rights and Responsibilities). This document may be assessed at the UWSP web site at *http://www.uwsp.edu/centers/rights/rights.pdf*.

"<u>Tentative</u>" schedule of C106 lecture topics for SPRING 2021

Wk	Lecture Topics (delivered in 5 videos of about 25 minutes each week)
1	• Review: Row 1 & 2 non-metal atom bonding patterns (valency & octet rules). • Chpt 21: Classification and nomenclature of small, simple organic molecules.
2	• Chpt 11: Introduction to intermolecular forces or IMF's (that are ignored in ideal gases). • Chpt 11: The role of IMF's in explaining the properties of different liquids (vs water).
3	• Chpt 11 Wrap-up. • Chpt 13: Solubility in water: the process of dissolution & factors that affect solubility. • Chpt 13: Solute concentration terms/units (and unit conversions).
4	• Chpt 13: Wrap-up solute concentration unit conversions • Chpt 13: Definition and application of colligative properties of aqueous solutions.
5	• **Mid-term Exam 1 (Chapters 21, 11, & 13)** • Chpt 14: Introduction to "COLLISION THEORY" of chemical reaction rates (Kinetics). • Chpt 14: Rate units, reaction mechanisms & RATE LAWS. • Chpt 14: Using tables of initial reaction rates to solve for each term in a given rate law.
6	• Chpt 14: Integrated rate laws for zero, first and second order processes. • Chpt 14: Transition state complexes, reaction profile diagrams and CATALYSTS. • Chpt 14: Wrap-up Chapter 14.
7	• Chpt 15: The equilibrium state (& equilibrium mixtures of a reversible processe in a closed system) • Chpt 15: Equilibrium constants, Keq (a State Property that varies with Temperature). • Chpt 15: Le-Chatelier's Principle & shifting equilibrium
8	• Chpt 15: Wrap-up Chapter 15. • Chpt 16A: Acids vs. Bases in water - - general descriptive properties & Arrhenius Theory • Chpt 16A: The pH scale and interconverting pH to $[H^+]$ and/or $[OH^-]$.
SPRING BREAK	
9	• **Mid-term Exam 2 (Chapters 13, 14, & 16A)** • Chpt 16B: Bronsted Lowry Theory of Acids vs. Bases in water & conjugate acid/base pairs. • Chpt 16B: Strong vs. Weak acids & bases described as Ka (& pKa) or Kb (& pKb) • Chpt 16B: Binary acids vs. oxy-acids: relationship between structure and strength (periodic trends)
10	• Chpt 17: Introduction to the common ion effect on percent ionization of acids (and salts). • Chpt 17: Acid-Base Neutralization Reactions & analysis by pH Titrations (vs. using a pH indicator).
11	• Chpt 17: Continue pH Titrations. pH Buffers (definition, preparation and applications) • Chpt 17: Chpt 17: Working with solubility constants (Ksp) of slightly soluble ionic compounds
12	• Chpt 17: Wrap-up • Chpt 18: Thermodynamics: Introduction to entropy (S), free-energy (G) & spontaneity
13	• **Mid-term Exam 3 (Chapters 16B and 17).** • Chpt 18: More on entropy (S): state changes & temperature dependence of molar entropy values. • Chpt 18: Correlation between standard state free energy (ΔG^o) and magnitude of Keq. • Chpt 18: Effect of reactant quotient (Q) on free energy changes (the Nernst Equation).
14	• Chpt 19: Review of simple redox (electron transfer) reactions between atoms & ions. • Chpt 19: Balancing simple redox reactions & identification of reducing vs. oxidizing agents. • Chpt 19: Designing simple galvanic cells that produce Voltage (electrical potential energy).
15	• Chpt 19: Using standard reduction potentials to calculate standard cell voltages . • Chpt 19: Calculating the voltages of a cell at non-standard concentrations (the Nernst equation). • Chpt 19: Converting cell voltages into concentrations of a reactant or product.
16	• **Midterm-exam 4 (Chapters 18 & 19)**