C106 Fundamental Chemistry Policies & Schedule for SPRING 2022

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INSTRUCTOR'S SCHEDULE

Time	Mon	Tue	Wed	Thr	Fri
8 AM		**C106.02L1 Lab 1 CBB 236 41001**	**C106.02L2 Lab 2 CBB 236 41003**		
9 AM					
10 AM					
11 AM				C106 02D4 CBB 261	
(12 PM)	**Office Hour** CBB 414		**Office Hour** CBB 414	C106 02D3 CBB 261	**Office Hour** CBB 414
1 PM	**C106-02** CBB 105		**C106-02** CBB 105		**C106-02** CBB 105
2 PM		**C106.02L3 Lab 3 CBB 236 (Dr Lawrence) 41005**	**C106.02L4 Lab 4 CBB 236 (Dr. Cole) 41007**	C106 02D2 CBB 261	
3 PM				C106 02D1 CBB 261	
4 PM					

Office Hours: *As my primary job is to help answer your questions about course topics, I have an* ***open-door*** *office policy: I will do my BEST to drop what I am doing in order to help you anytime that you knock on my door.* If your schedule conflicts with the posted office hours, please contact me by email to arrange a different meeting time.

The **5-digit numbers in red** for lab sections 1-4 are the **LabFlow Registration Codes** needed to sign-up for the electronic packet of laboratory exercises required for the lab portion of C105.

Course Description:

- Chemistry 106 is the second semester of a college-level **General Chemistry** course. Importantly, C106 also serves as the gateway into upper-level chemistry courses at UWSP (including C220, C248 & C325) and the course is evaluated in that context.

- Many concepts & skills developed in C105 are applied in describing:

A) The properties of **liquids & aqueous solutions**;
B) The **rates & pathways** between reactants vs. products of a balanced reaction (kinetics);
C) The nature of the **equilibrium state of reversible reaction in a closed system** with particular Memphasis 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 required minimum grade of C-minus.
- **M107 (Algebra/Pre-Calculus):** In comparison to C105, many concepts in C106 utilize logarithmic & inverse-logarithm math functions (both base-10 and natural logs) and there are many 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 perform logarithmic & anti-logarithmic functions. The **TI-30XA** calculator is VERY inexpensive and performs well for ANY task needed in C105 & C106. Calculators are NOT provided for exams, so don't forget !!

- **Lab Flow Registration:** Labflow is the electronic LMS (learning management system) UWSP has contracted with for online lab instructions/descriptive videos, prelab quizzes, and assessment of electronically submitted lab reports. You can register with LabFlow through the bookstore OR directly from Lab Flow using the code numbers provided in the schedule above.

- **Personal computer & printer access.** A personal computer/mobile device is required to access both Labflow & the course CANVAS page. Furthermore, you will routinely need access to a printer for making hard copies of course materials.

- 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 C106.

Attendance & expectations

- I do not take attendance! Likewise, I do not collect, grade & assign points to textbook problems or weekly check-in quizzes. Instead, solution sets (answer keys) to ALL assigned text-book problems and check-in quizzes are provided for you to self-assess your progress in C106.

- HOWEVER, experience informs me that most students benefit greatly from **active & engaged participation** in all portions of the course. In this sense, attendance to all lecture, discussion and laboratory meetings is expected (if not mandatory).

- You are responsible for ALL material or information missed due to any absence. If you need to miss a class, slides of KEY topics & examples will be posted on the course CANVAS page.

- **E-MAIL/OUTLOOK:** I communicate with students on a regular basis via email (I rarely make class announcements on the course CANVAS page). Be sure that you have access to OUTLOOK on your computer and/or mobile device.

- **Chemistry is mastered through problem solving!!!** There is NO magic pill or trick around this issue. The more problems you solve, the more likely that you will earn a satisfactory letter grade. Don't be afraid to make mistakes (we all do). Learn from them & try not to repeat them.

- **Minimal expected out-of-class workload:** *students that devote 8-12 hours outside of class EACH and EVERY week are more likely to earn a satisfactory grade compared to students that cram all text-book problems and check-in quizzes in just 1-week (or less) before an exam.*

✓ About 2 hours of **active study** between EACH lecture (i.e. 6-hrs per week). I advise reviewing/rewriting lecture notes, reading related text-book material (a second perspective is often helpful) & solving text-book problems.

✓ About 3-4 hours in both pre-lab preparation (videos & prelab quizzes) & electronic submission of completed lab reports.

✓ Ungraded Quizzes: (i) weekend **"check-in" quizzes** and (ii) end-of-chapter **self-assessment quizzes**. Many (if not most) questions on each mid-term exam are direct or indirect examples of problems from these quizzes.

Mid-term exam schedule: Each midterm exam will be in room 105 of the CBB.

Midterm	Date, Time & Location	Points
1	**Tuesday February 15, 2022 (Week 4).** **Time: 7:00 to 8:10 PM**	200
2	**Monday March 14, 2022 (Week 8).** **Time: 7:00 to 8:10 PM**	200
3	**Tuesday April 5, 2022 (Week 10).** **Time: 7:00 to 8:10 PM**	200
4	**Tuesday April 26, 2022 (Week 13).** **Time: 7:00 to 8:10 PM**	200
5	**Wednesday May, 18, 2022 (Week 16).** **Time: 2:45 PM to 4:45 PM**	200

Make-up exams? NO MAKE-UP EXAMS ARE PROVIDED **without a 24-hour advanced notification** that includes a written verification describing the reason for the excused absence!

Low Exam Replacement Score: The lowest midterm exam score is replaced with the average score of all five exams. This policy ensures that one very bad exam (or missed exam) has minimal impact on your letter grade.

Grading Scale:

- **Letter grades** are assigned based on the percentage earned of about **1260 total points** according to the grading scale posted below: The 1260 point total represents (i) 5x midterm exams (at 200 points each for 1000 points) and (ii) 14x lab assignments (at 20 points each for 280 points).
- **Lab Absences?** The point total of one lab assignment (20 points) is dropped from the total point basis to ensure that one lab absence will not lower your letter grade. However, a 2nd or 3rd absence will impact your grade while a 4th lab absence results in an automatic course failure. NOTE: if you are absent from lab, you may not submit a report using data from other students. However, you can (and should) complete the pre-lab quiz for the missing lab assignment. This policy also provides 20 extra credit points to students with perfect lab attendance.

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
62-68 %	D
Below 62%	F

- I reserve the right **to lower** (**but will never increase)** the posted grading scale.
- Each mid-term exam has a built-in extra-credit value of 10 points (or 5%). That is, a perfect score is recorded as 210 out of 200 points.
- This policy awards 50 points to each student, and, for that reason I do not round up letter grades that miss the required mark by a few points.

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 lab exercises, ungraded quizzes and textbook problems.

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*.

"Tentative" schedule of C106 lecture topics for SPRING 2022

Week	Tentative Topics
1	• C106 Policies & Expectations • **Chapter 21: Simple organic molecules: Structure, nomenclature & physical properties** • Unbranched, branched & halogenated alkanes • Alkenes, alkynes, alcohols, ketones, aldehydes, carboxylic acids, amines.
2	• **Chapter 11: Intramolecular forces & their effect on liquid properties** • Review of kinetic molecular theory (KMT) • Dispersion forces, dipole-dipole attractions, hydrogen bonding. • Liquid properties: boiling point, viscosity, surface tension, vapor pressure/volatility.
3	• Heating curves & phase diagrams • **Chapter 13: Properties of dilute aqueous solutions** • Solubility in water: the dissolution process & factors that affect solubility. • Solute concentration terms/units (and unit conversions).
4	• **Midterm 1: Chapters 21 & 11** • Wrap-up solute concentration terms & unit conversions • Colligative properties of aqueous solutions: definitions & applications.
5	• **Chapter 14: Kinetics: Collision theory of reaction rates** • Rate units, reaction mechanisms & RATE LAWS. • Collision types: uni-molecular vs. bi-molecular (& higher order collisions) • Deriving rate law terms from a table of initial reaction rates.
6	• Integrated rate laws for zero, first and second order processes. • Catalysts & reaction profile diagrams.
7	• Wrap-up kinetics • **Chapter 15: Introduction to the equilibrium state (reversible reactions in a closed system)** • Keq – the equilibrium constant is a temperature dependent state property • Le-Chatelier's Principle & shifting equilibrium
8	• **Midterm 2: Chapters 13 & 14** • Continuation of Le Chatelier's Principle • Wrap-up Chapter 15. • **Chapter 16: Equilibrium of acidic solutions (acids in water) & basic solutions (bases in water)** • Properties of acids vs, bases and the pH scale.
SPRING BREAK	
9	• Bronsted Lowry Theory of Acids vs. Bases in water & conjugate acid/base pairs. • Strong vs. Weak acids & bases described as Ka (& pKa) or Kb (& pKb)
10	• **Midterm 3: Chapters 15 & 16** • Binary acids vs. oxy-acids: relationship between structure and strength (periodic trends) • **Chapter 17: The common ion effect: neutralizations, pH buffers, solubility products.** • Acid-Base Neutralization Reactions • pH Titrations (vs. titrations with a pH indicator).
11	• Continue pH Titrations • pH Buffers (definition, preparation and applications) • Working with solubility constants (Ksp) of slightly soluble ionic compounds
12	• Continue applications of solubility constants (Ksp) • **Chpt 18: Thermodynamics: Introduction to entropy (S), free-energy (G) & spontaneity**
13	• **Midterm 4: Chapters 16 & 17** • More on entropy (S): state changes & temperature dependence of molar entropy values. • Correlation between standard state free energy (ΔG^o) and magnitude of Keq. • Effect of reactant quotient (Q) on free energy changes (the Nernst Equation).

14	• Wrap-up thermodynamics & spontaneity (chapter 18) • **Chapter 19: Electrochemistry: thermodynamic applications in redox reactions (batteries)** • Balancing simple redox reactions & identification of reducing vs. oxidizing agents. • Designing simple galvanic cells that produce Voltage (electrical potential energy).
15	• Using standard-state reduction potentials to calculate standard-state cell voltages . • Calculating the battery voltages at non-standard concentrations (the Nernst equation). • Converting cell voltages into concentrations of a reactant or product.
16	• **Midterm-exam 4 (Chapters 18 & 19)**

"<u>Tentative</u>" schedule of C106 lecture topics for SPRING 2022

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 14, 15, & 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)**