



Welcome to Fundamental Chemistry

CHEM 106, Fall 2021

Lecture:

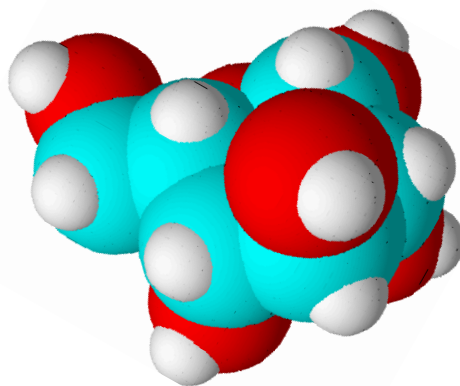
Tuesday, Thursday, and Friday
9:00 – 9:50 AM, CBB 105

Discussion:

Section 1: Mondays, 1:00 – 1:50 PM, CBB 165
Section 2: Mondays, 2:00 – 2:50 PM, CBB 165
Section 3: Mondays, 3:00 – 3:50 PM, CBB 165

Laboratory:

Section 1: Tuesdays, 2:00 – 4:50 PM, CBB 236
Section 2: Wednesdays, 2:00 – 4:50 PM, CBB 236
Section 1: Thursdays, 2:00 – 4:50 PM, CBB 236



Contact Information:

Dr. Dave Snyder
dave.snyder@uwsp.edu

Office Location: CBB 445

Office Hours: TBD

Table of Contents

| | |
|---|----|
| About the Instructor | 2 |
| What is this course all about?..... | 2 |
| Dr. Snyder’s Weekly Schedule and Office Hours | 2 |
| COVID-19 Health and Safety | 3 |
| Chemistry Learning Outcomes..... | 3 |
| General Education Learning Outcomes | 4 |
| Inclusive Excellence..... | 4 |
| Course Format..... | 5 |
| Learning Resources and Required Materials | 5 |
| Support and Help is Available!..... | 6 |
| Course Policies | 7 |
| Assignments..... | 8 |
| Grading Information | 9 |
| Course Outline and Tentative Lecture Schedule..... | 11 |
| Laboratory Schedule | 12 |

About the Instructor



My name is Dr. Dave Snyder, and I am excited about the opportunity to work with you this semester. I teach courses in general and analytical chemistry here at UWSP (CHEM 100, 105, 106, 117, 248, and 446) and conduct environmental chemistry research with a small group of students each semester. I love teaching and interacting with my students, and I hope that you will enjoy being in my class. This course will be very challenging, but please be assured that I will be there to support you and guide you along the way.

What is this course all about?

CHEM 105 and 106 together provide a broad introduction to the field of chemistry. In CHEM 105, you explored the nature of matter and the basics of chemical reactions. In CHEM 106, we will explore the physical and chemical interactions between atoms, molecules, and ions in greater detail and learn how to describe a chemical reaction in terms of its speed (kinetics), spontaneity (thermodynamics), and completion (chemical equilibrium). To master these ideas, you must have a solid understanding of the material taught in CHEM 105 and are encouraged to review your notes from CHEM 105 and complete the review problems found on Canvas.

Dr. Snyder's Weekly Schedule and Office Hours

Walk-in office hours are available at 10:00 AM, Monday – Friday without an appointment. Virtual office hours are available on a first come, first-served basis during these times via the following zoom link: (<https://wisconsin-edu.zoom.us/j/7424698010>). You may also make an appointment to meet with me during any other the times marked as “RPG” on my schedule by sending me an e-mail request at dasnyder@uwsp.edu.

| | Monday | Tuesday | Wednesday | Thursday | Friday |
|-------|--------------------------------|---------------------------|-------------------------|---------------------------|---------------------------|
| 08:00 | RPG | RPG | RPG | RPG | RPG |
| 09:00 | RPG | 106 Lecture 01 CBB 105 | RPG | 106 Lecture 01 CBB 105 | 106 Lecture 01 CBB 105 |
| 10:00 | Office Hour | Office Hour | Office Hour | Office Hour | Office Hour |
| 11:00 | RPG | RPG | RPG | RPG | RPG |
| 12:00 | RPG | RPG | RPG | RPG | RPG |
| 13:00 | 106 Discussion CBB 165 (D1) | RPG | RPG | RPG | RPG |
| 14:00 | 106 Discussion CBB 165 (D2) | 106 Lab (L1) CBB 236 | 106 Lab (L2) CBB 236 | 106 Lab (L3) CBB 236 | Meeting |
| 15:00 | 106 Discussion CBB 165 (D3) | 106 Lab (L1) CBB 236 | 106 Lab (L2) CBB 236 | 106 Lab (L3) CBB 236 | Meeting |
| 16:00 | RPG | 106 Lab (L1) CBB 236 | 106 Lab (L2) CBB 236 | 106 Lab (L3) CBB 236 | RPG |

RPG = Research, Prep, and Grading

COVID-19 Health and Safety

1. Face Coverings:

Effective Monday, August 9, 2021, and until further notice, face coverings are required to be worn by everyone in all indoor spaces on campus. Face covering means a piece of cloth or other material that is worn to **cover the nose and mouth completely**. A face covering must be secured to the head with ties, ear loops or elastic bands that go behind the head and must fit snugly but comfortably against the side of the face. Cloth face coverings must be made with two or more layers of breathable fabric that is tightly woven (i.e., fabrics that do not let light pass through when held up to a light source). A face covering does not include bandanas, single layer neck gaiters, plexiglass barriers, face shields, goggles, scarves, ski masks, balaclavas shirt or sweater collars pulled up over the mouth and nose, or masks with slits, exhalation valves or punctures because public health experts have determined that these types of coverings are ineffective at preventing respiratory droplets from entering the air.

Requests for exceptions to this order should be made to Human Resources (employees) or Disability and Assistive Technology Center (students) and will be evaluated on an individualized basis utilizing the interactive reasonable accommodations process.

2. Other Guidance:

Please monitor your own health each day using [this screening tool](#). If you are not feeling well or believe you have been exposed to COVID-19, do not come to class; email your instructor and contact Student Health Service (715-346-4646).

- As with any type of absence, students are expected to communicate their need to be absent and complete the course requirements as outlined in the syllabus.
- Maintain a minimum of 6 feet of physical distance from others whenever possible.
- Do not congregate in groups before or after class; stagger your arrival and departure from the classroom, lab, or meeting room.
- Wash your hands or use appropriate hand sanitizer regularly and avoid touching your face.
- Please maintain these same healthy practices outside the classroom.

Chemistry Learning Outcomes

After successful completion of this course, students should be able to

- Chemical and Physical Properties of Matter:
 - Determine the type of intermolecular forces (IMFs) present in molecules from their Lewis structures
 - Use IMFs to predict the solubility of compounds in polar and non-polar solvents and the relative boiling and melting points of a homologous series of substances
 - Qualitatively and quantitatively describe the impact of solute concentration on the colligative properties of solutions

- Kinetics:
 - Use experimental data to determine reaction orders, rate laws, and the rate of a chemical reaction
 - Use reaction rate laws to predict the amount of a product or reactant present in a reaction mixture at any point in a reaction
- Chemical Equilibrium:
 - Determine the equilibrium position and concentrations of products and reactants for equilibrium reactions, including acid-base, solubility, and electrochemical reactions that come to an equilibrium state
- Thermodynamics:
 - Qualitatively and quantitatively describe chemical reactions in terms of enthalpy, entropy, free energy, and spontaneity

General Education Learning Outcomes

This course meets the requirements for the General Education Program (GEP) Natural Science Investigation Level requirement. As such, upon successful completing of this course, students should be able to:

- Explain major concepts, methods, or theories in the natural sciences to investigate the physical world.
- Interpret information, solve problems, and make decisions by applying natural science concepts, methods, and quantitative techniques.
- Describe the relevance of aspects of the natural sciences to their lives and society.

Inclusive Excellence

I recognize that students in my classroom may have diverse racial, ethnic, cultural, and religious backgrounds, sexual orientations, and gender identities. I further recognized that students in my classroom may face unique challenges due to health conditions, family obligations, current or past military service, and other situations that may result in significant obstacles to learning.

I am committed to providing a civil, respectful, and equitable classroom where all my students have the opportunity to succeed and feel safe and valued. I believe diversity should be celebrated and embraced because it helps to create an optimal environment for shared inquiry and the development of sophisticated graduates who recognize the value of diversity and human dignity.

I welcome your suggestions and ideas on how we can create and maintain an inclusive and equitable learning environment during the semester.

Course Format

Lecture

During lectures, concepts and example problems will be presented. You should come to lecture prepared, having read the assigned portion(s) of the textbook, and prepared to take notes, ask questions, and participate in discussions. It is strongly encouraged that you re-copy your notes as soon as possible after each lecture and share your notes with 1 or 2 other students to ensure that you did not miss anything.

Discussion

Discussion sessions will include a question-and-answer period, group problem solving, and a weekly quiz. You will have the opportunity to take the quiz both as an individual and as a part of a group. Please come to discussion with your completed homework assignment, as there will also be an opportunity to compare answers with your classmates.

Laboratory

Lab periods will provide you with the opportunity to make observations, engage in scientific reasoning, interact directly with natural phenomena, use scientific tools, and learn to record, analyze, and report scientific data and results. Getting the most out of lab requires that you be punctual, attentive, and curious. We will be using an application called *Labflow* to complete lab experiments and submit lab results and reports. **You will need to bring a printed copy of the lab procedure pages with you to lab.** It is also critical that you come to lab prepared, so please read lab procedures, watch assigned videos, and complete per-lab activities before attending lab.

Learning Resources and Required Materials

Textbook: Chemistry: Structure and Properties, 2nd ed. by Nivaldo J. Tro
Available through text rental at the University Store

Lab Flow License

We will be using a lab course management software called *Labflow* for laboratory experiments this semester. This software package will provide you with information, lab instructions and helpful videos. You will submit your lab results and reports using Labflow. More information will be provided during your first week of class. *The license for this software can be purchased at the University Store.*

Scientific Calculator: You will need a scientific calculator with log functions. It does not have to be a fancy, expensive graphing calculator.

Lab Goggles: Lab goggles (not glasses) are required for all laboratory experiments and are available for sale at The University Store/ Text Rental. If you are planning on taking many lab courses, purchasing a pair of quality goggles will be a good investment. The Student Chapter of the ACS will have goggles for sale sometime during the semester.

Canvas Course Site

Course documents, including assignments, rubrics, the syllabus, and other supporting material, can be found on the course Canvas site (login at <https://uwstp.instructure.com> or use the link in the UWSP homepage under the *logins* tab). Your grades can be found on this site as well. I will post content and update grades almost every day, so be sure to check Canvas often. I expect you to read and review all of the material I post to the Canvas site.

E-Mail

Please feel free to email me at dave.snyder@uwsp.edu if you have any questions or concerns during the semester. While I may not be able to reply to your messages instantly, I will do my best to reply as quickly as possible. Email messages should be professionally formatted, should include an appropriate salutation (e.g., “Dear Dr. Snyder”), an appropriate closing (“Sincerely, Steve E. Pointer”), and should be written in Standard English. Sending me e-mails is a good opportunity to develop or improve your professional communication skills.

Support and Help is Available!

Instructor and Tutoring Support

- **Instructor Office Hours:** During office hours, I am available to assist you in all aspects of this course. You do not need to make an appointment to stop by during “drop-in” office hours but should contact me in advance for appointments at other times. I expect that you will need help with this course and am always happy to work with you.
- **Group Tutoring:** Group tutoring will be available for this class. The dates and times for these sessions will be announced during the second week of class. Ms. Jenna Macijeski, who has taken CHEM 106 from me previously, will be our group tutor this semester. She will visit our class to talk about group tutoring during.
- **Individual Tutoring:** The Tutoring-Learning Center (TLC) offers **FREE** tutoring to support you in your STEM classes. The tutors are UWSP students who have done well in their classes and who are here to share their successful study habits and content knowledge to help others succeed. Discussing concepts and practicing problems together clarifies and solidifies knowledge, and the tutors are eager to study with you. If you have questions about the schedules or would like to make an appointment, please visit the TLC in ALB 018 (library basement), email (tlctutor@uwsp.edu), or call (715) 346-3568.

Fall 2021 Tutoring Schedule

| | Location | Schedule | Cost |
|-------------------------|----------|---|------|
| CHEM 106 Group Tutoring | TBD | TBD | Free |
| STEM Drop-In Tutoring | CBB 190 | No appointment needed – stop by when tutors are available: https://www.uwsp.edu/tlc/Pages/droplnTutoring.aspx . | Free |
| STEM 1-on-1 Tutoring | ALB 018 | By appointment. Visit ALB 018 (library basement) to make a request or complete online request form here: https://www.uwsp.edu/tlc/Pages/request-math-science-tutoring.aspx . | Free |

Disability Services

The University of Wisconsin Stevens Point is committed to providing students with disabilities the academic accommodations and auxiliary aids necessary to ensure access to all university services, programs and activities. In addition to the university's campus wide efforts to promote access and inclusion, students with disabilities are further accommodated based on specific individual needs. The Disability and Assistive Technology Center (DATC) is responsible for determining these accommodations. They provide services and assistance to enrolled students who are either permanently or temporarily disabled.

- The registration process can take up to 3 weeks to complete, so if you believe you will require accommodations, begin the process as soon as possible. To start the process, contact The Disability and Assistive Technology Center (DATC) at 715-346-3365 or emailing datctr@uwsp.edu
- UWSP has many services for students offered by various offices. Although decisions regarding disability specific accommodations are made on a case by case basis.
- Visit the Disability and Assistive Technology Center (DATC) website at: <http://www.uwsp.edu/disability/Pages/default.aspx> for information on services offered to students with specific disabilities

Advocacy

In the case of extended illness, family emergencies, or other unforeseen personal situations that present a significant challenge to successfully completing a course, students should contact the Dean of Students (call 715-346-2611, email DOS@uwsp.edu, or visit the DOS office at 212 Old Main). The dean and his staff will provide discreet advocacy and advice for students having academic, personal, or other non-academic concerns. When times are tough, don't go it alone!

Course Policies

Participation and Attendance Policy

While there is not a formal attendance policy and no points will be assigned for attendance, failure to attend and participate in class activities is likely to affect your ability to learn/master material, and in-

turn, will affect your course grade. If you must miss class, please inform the instructor as soon as you can, get notes from at least two other students, and plan on attending office hours to ask questions.

Academic Integrity Policy

The Board of Regents, administrators, faculty, academic staff, and students of the University of Wisconsin system believe that academic honesty and integrity are fundamental to the mission of higher education and of the University of Wisconsin system. Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others' academic endeavors. Students who violate these standards will be confronted and must accept the consequences of their actions. More information on UWSP academic standards and disciplinary procedures pertaining to academic misconduct can be found at:

<http://www.uwsp.edu/admin/stuaffairs/rights/rightsChap14.pdf>

Late Work /Missed Test Policy

- Late lab reports and prelab quizzes will be assessed a 50% penalty. The deduction will be taken from the total points a student earns on the report (example: a student who earns 8/10 on a late lab report will receive 4 points instead of 8). A report will be considered late if it is turned in after midnight on the day that it is due. Lab reports turned in more than 7 days late will receive a score of zero.
- No credit will be given for late homework assignments.
- One week's notice must be given to reschedule a test. A missed test may be made up by taking the optional, comprehensive final exam. Test 4 will not be available before the final exam period
- Make-up labs and online labs will not be available; however, the lowest 2 lab scores will be dropped when calculating the final course grade.

Policy Disclaimer: The instructor reserves the right to change or amend course policies at his discretion on a case-by-case basis.

Assignments

Homework Assignments

A homework assignment will be posted to Canvas each week. Homework assignment typically contain 20 problems. You will submit answers via a Canvas quiz. **Homework answers are due by midnight each Monday.** Solutions will be posted immediately after the due date/time. To receive credit for your assignment, you must (1) submit your answers in Canvas and (2) **hand in a legible set of solutions (i.e., show me your work) in lecture on Tuesday.** Solutions must be physically submitted – email copies will not be accepted. Failure to submit answers or solutions will result in a score of 0 for the assignment.

Discussion Quizzes

Discussion quizzes will take place in 2 parts. Each student will take the quiz as an individual (this portion is worth 70% of the quiz score) and as part of a group (this portion will be worth 30% of the quiz score). The individual quiz will be taken during discussion, and the **group quiz** will be a take-home quiz with the **answers due at the beginning of lecture on Tuesday.**

Laboratory Reports

Each laboratory exercise will require the completion of a prelab quiz and a lab report, both of which will be submitted through Labflow. **Prelab quizzes are due by midnight on the Sunday** before the lab is scheduled, and **lab reports are due by midnight on the Friday** after the lab has been completed. Students are strongly encouraged to complete their lab reports in lab.

Tests and Optional Comprehensive Final Exam

Four tests will be given this semester – once every four weeks. With the exception of Test 4, all tests will be given during lecture on a Friday. Test 4 will be given during the final exam period (see course schedule for more information). A study guide will be posted at least one week before each test.

An optional comprehensive final exam will also be available to take during finals week. This exam will cover the material covered in Tests 1 – 3, and the score on the final may be used to replace the lowest score received on these tests. Students must inform the instructor of their intention to take the optional final no later than 5 pm on Friday, December 10th. Note that students opting to take the optional final must also complete Test 4. The optional final exam will be given on Tuesday, December 14 at 5:00 PM (location TBD).

Weekly Due Date Calendar

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|--|--|---|-------------------|-------------------|---------------------------------------|-------------------|
| Prelab quiz due in Labflow by midnight | Homework answers due in Canvas by midnight | Hand in written homework solutions during lecture | No assignment due | No assignment due | Lab report due in Labflow by midnight | No assignment due |

Grading Information

The final course grade will be determined by a weighted scale as show below. Numbers in parentheses represent the number of items included in each category. If more than this number of items is assigned, low scores will be dropped (for example, 11 lab exercises are assigned, so 2 are dropped and only the highest 9 will count towards the final grade).

| Category | Weight |
|--------------------------|---------------|
| Homework (11) | 10 % |
| Discussion Quizzes (10) | 10 % |
| Lab Exercises (9) | 30 % |
| Tests 1, 2, 3 (3) | 37.5 % |
| Test 4 (1) | 12.5 % |
| Optional Final Exam (1)* | 0 % |
| Total | 100 % |

*If taken, the final can take the place of the lowest score from Test 1, 2 or 3

The following scale will be used to assign letter grades. Note that at UWSP, a grade of “D-“ is not given.

| Grade | Range (%) | Grade | Range (%) |
|--------------|------------------|--------------|------------------|
| A | 100 - 94 | C+ | 76 - 79 |
| A- | 90 - 93 | C | 73 - 75 |
| B+ | 86 - 89 | C- | 70 - 72 |
| B | 83 - 85 | D+ | 66 - 69 |
| B- | 80 - 82 | D | 63 - 65 |
| | | F | 0 - 62 |

Grades Assigned by Canvas and Labflow

All assignments graded by Canvas or Labflow will be reviewed and regraded after the due date to ensure that students earn appropriate credit for their answers. Note that you will have 2 attempts to complete the Labflow prelab quiz and the lab report. Please note however, that you will see similar (but not the same) quiz questions on your second attempt. The higher of your two attempts will be recorded.

Final Course Grades

I invite you to come and discuss your grade with me at any time during the semester. I welcome these conversations, and I am more than happy to help you to develop study strategies that can assist you in becoming a better thinker, learner, and problem solver – skills that can help you to improve your grade. Additionally, if I have made a mistake in grading an assignment (it happens – I am not perfect), I want to know right away so that I can correct the error. However, unless a mistake has been made in calculating your final grade, course grades posted after the final exam are final and not subject to change. I always look at your grade and will round in your favor if you are in-between grades; however, I do not “bump” students up to a higher grade, provide extra credit or work opportunities, or change the grading scale after the final exam has been completed.

Course Outline and Tentative Lecture Schedule

| Week | Dates | Chapter(s) | Events | Topics Covered |
|------|---|------------|---------------------|---------------------------------------|
| 1 | 9/2, 9/3 | | | Course Intro, Review |
| 2 | 9/7, 9/9, 9/10 | 11 | | Intermolecular Forces |
| 3 | 9/14 [†] , 9/16, 9/17 | 13 | | Solutions |
| 4 | 9/21, 9/23, 9/24 | 14 | Test 1 | Chemical Kinetics |
| 5 | 9/28, 9/30, 10/1 | 14, 15 | | Kinetics, Chemical Equilibrium |
| 6 | 10/5, 10/7, 10/8 | 15, 16 | | Chemical Equilibrium, Acids and Bases |
| 7 | 10/12, 10/14, 10/15 | 16 | | Acid – Base Equilibrium |
| 8 | 10/19, 10/21, 10/22 | 17 | Test 2 | Aqueous Equilibrium |
| 9 | 10/26, 10/28, 10/29 | 17 | | Aqueous Equilibrium |
| 10 | 11/2, 11/4, 11/5 [‡] | 18 | | Thermodynamics |
| 11 | 11/9, 11/11, 11/12 | 18 | | Thermodynamics |
| 12 | 11/16, 11/18, 11/19 | 19 | Test 3 | Electrochemistry |
| 13 | 11/23 | | Thanksgiving | |
| 14 | 11/30, 12/2, 12/3 | 19 | | Electrochemistry |
| 15 | 12/7, 12/9, 12/10 | 20 | | Nuclear Chemistry |
| 16 | Tuesday, Dec. 14 10:15 am – 12:15 pm | | Test 4 | |

Other Important Dates:

[†]9/14: Last day to add a course or drop this course without a grade (course will not appear on your transcript)

[‡]11/5: Last day to drop this course (a grade of “W” will appear on your transcript)

Laboratory Schedule

| Week | Dates | Experiment |
|------|---------------|---|
| 1 | 9/2 – 9/3 | No Lab |
| 2 | 9/7 – 9/9 | Lab Safety and Check-in |
| 3 | 9/14 – 9/16 | Fundamental Measurement Techniques |
| 4 | 9/21 – 9/23 | Solutions, Electrolytes, and Concentrations |
| 5 | 9/28 – 9/30 | Molar Mass of Solute by Freezing Point Depression |
| 6 | 10/5 – 10/7 | Iodine Clock Reaction |
| 7 | 10/12 – 10/14 | No Lab |
| 8 | 10/19 – 10/21 | Le Châtelier's Principle |
| 9 | 10/26 – 10/28 | Determination of Molar Mass and Identity of Diprotic Acid |
| 10 | 11/2 – 11/4 | Determination of K_{sp} |
| 11 | 11/9 – 11/11 | Entropy of Borax Dissolution |
| 12 | 11/16 – 11/18 | Determination of Amount of NaOCl in Bleach |
| 13 | 11/23 – 11/25 | No Lab |
| 14 | 11/30 – 12/2 | Voltaic Cells |
| 15 | 12/7 – 12/9 | Check Out |

Notes:

Prelab quizzes are due at midnight on the Sunday prior to the day the lab is scheduled

Lab reports are due at midnight on the Friday following the day the lab is scheduled