

Chemistry of the Elements
CHEM 2131 Section 1
Winter Quarter, 2017



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Lecture: MWF 9:00 a.m. – 9:50 am (F.W. Olin 205)

Recitation: T 9:00 a.m. – 9:50 am (F.W. Olin 205)

Office Hours: MTW 10:00 – 11:00 a.m., or by appointment. Please email for appointments.

Required Text:

https://chem.libretexts.org/LibreTexts/University_of_Denver/Chem_2132%3A_Chemistry_of_the_Elements

Chemistry: The Molecular Nature of Matter and Change - 7th Edition by Martin Silberberg (Author), Patricia Amateis

<https://openstax.org/details/chemistry#resources>

Course Objective:

We will continue to build on basic chemical concepts covered in general chemistry I and II, and then introduce the field of inorganic chemistry. Our focus would be understanding chemical principles in coordination chemistry, solid state chemistry, electrochemistry, nuclear chemistry, and the chemical properties of main group 2A – 8A elements.

Lectures: The lectures will generally follow selected sections of the textbook and the online text materials (see schedule). Most lectures will be presented on the board and PowerPoint slides. *Attending every class and taking meaningful notes is incredibly important for this class.* Keeping up with the reading will help you better understand the lectures and take more meaningful notes. Also, we will work through problems during

lectures and recitations to help you understand each concept and build the necessary problem solving skills required to excel in the class.

Recitation: Thursday recitations will be an opportunity to go over challenging problems from the homework assignments or review particular topics. We may use some recitation sections for a normal lecture. There may also be short quizzes (1-2 questions, ~20 min) that could be worth bonus points...

Homework: Homework is essential for developing the desired skills you will need to succeed in this class. The homework would be pulled from the study materials in class and required text.

- **Weekly Homework:** There will be weekly problems posted on Canvas. **You are to submit solutions to the homework problems by 5 pm on Mondays** of each week except the first and last Mondays of the quarter.
- **Assigned Homework:** There will be two assigned homework for the quarter. Homework will be announced in class and posted on Canvas.

Homework for this quarter is worth 200 points (25% of your total grade), so take it seriously.

Calculator: Any simple or graphing calculator would be sufficient for calculations covered in this course.

Exams: There will be two midterm exams during the quarter, each worth 200 points and a final exam also worth 200 points. If your final exam score is higher than either midterms, the lowest score will be dropped and replaced with your score on the final.

Final Grade: Your final grade will be determined out of the 800 available points earned from exams and homework (plus all earned bonus points). **There will be no makeup exams.** If you miss an exam for any reason, that exam will be dropped and the final will count for -/200 points for that exam. **The final exam is not optional – NO EXCEPTION**

| Grade | Range | Grade | Range |
|-------|------------|-------|-----------|
| A | 100 – 94 % | C- | <74 – 70% |
| A- | <94 – 90% | D+ | <70 – 67% |
| B+ | <90 – 87% | D | <67 – 64% |
| B | <87 – 84% | D- | <64 – 61% |
| B- | <84 – 80% | F | <60 – 0% |
| C+ | <80 – 77% | | |
| C | <77 – 74% | | |

Note: Final grades and percentage ranges are subject to change by the instructor

Cell Phone and Electronic Device Policy:

While I understand that mobile devices have become integral to our lives, they are disruptive to the learning environment. Therefore, I request that all electronic devices be turned off (not muted) during class (i.e.; please don't text/Facebook during class). If an emergency arises, and you need to contact the outside world during our lecture or recitation time, I request that you quietly leave the room and conduct your conversation outside. Additionally, most of our lectures will require far too much structural drawing for effective notes to be taken on a laptop, so please leave these devices off during lecture.

Lecture and Testing Accommodations:

I will make every effort to accommodate students diagnosed with a learning disability. I will do this in complete confidence. I do, however, request that any student requiring these accommodations inform me the first week of class. For further information, please see the University Disability Services' website at <http://www.du.edu/disability/dsp/index.html>.

Academic Integrity:

While I advocate collaborative learning and teamwork, I also firmly believe that everyone should maintain the highest ethical standards. As such, I support and will strictly enforce the Honor Code of the University of Denver. www.du.edu/honorcode.

Honor Code Statement.

All members of the University of Denver are expected to uphold the values of *Integrity*, *Respect*, and *Responsibility*. These values embody the standards of conduct for students, staff, faculty, and administrators as members of the University community. These values are defined as:

Integrity: acting in an honest and ethical manner;

Respect: honoring differences in people, ideas, and opinions;

Responsibility: accepting ownership for one's own conduct.

Pioneer Pledge.

As a University of Denver Pioneer I pledge...

- to act with INTEGRITY and pursue academic excellence;
 - to RESPECT differences in people, ideas, and opinions and;
 - to accept my RESPONSIBILITY as a local and global citizen;
- Because I take pride in the University of Denver I will uphold the *Honor Code* and encourage others to follow my example.

Topics to be covered: Tentative Course Schedule – Subject to Change

| Weeks | Date'17 | Topic | Reading | Due |
|--------------|----------------|--|--------------------------------------|------------|
| Wk1 | M - 03/27 | Brønsted-Lowry and Lewis Acid-Base Theory, HSAB | OS: 15.2 | |
| | W - 03/29 | Introduction to Coordination Chemistry: Coordination, Ligands, and Structure | Ch23, CW: 2.2 OS: 19.1, | |
| | F - 03/31 | Nomenclature of Coordination Compounds | Ch23, CW: 2.4 OS:19.2 | |
| Wk2 | M - 04/03 | Structure and Isomerism | Ch23, CW: 3.1-3.6 OS:19.2 | PNB |
| | W - 04/05 | Structure and Isomerism | Ch23, CW: 3.1-3.6 OS:19.2 | |
| | F - 04/07 | Coordination Bonding Theory | Ch23, CW: 4.1-4.3 OS: 19.3 | |
| Wk3 | M - 04/10 | Crystal Field Splitting, Spectrochemical series | Ch23, CW: 4.1-4.3 OS: 19.3 | PNB |
| | W - 04/12 | Magnetic Properties and Absorption Spectroscopy/ Color | Ch23, CW: 4.1-4.3 OS: 19.3 | |
| | F - 04/14 | Applications of Coordination Compounds | Ch23, CW: 6.1-6.4 | |
| Wk4 | M - 04/17 | EXAM #1 | | PNB |
| | W - 04/19 | Bioinorganic Applications of Coordination Chemistry | CW: 6.1-6.4 | |
| | F - 04/21 | Properties of Solids: Ionic, Network, and Molecular crystals | Ch12.6, CW: 7.1 | |
| Wk5 | M - 04/24 | Solid-state structures: Crystal Lattices and Unit Cells and Lattice Energy | Ch12.6, CW: 7.2-7.6 | PNB |
| | W - 04/26 | Periodic Trends: Ionic Radii, Electronegativity, etc. | CW: 9.1 OS: 6.5 | |
| | F - 04/28 | Uniqueness principle, Diagonal Effect, Inert Pair Effect | CW: 9.2-9.4 | |
| Wk6 | M - 05/01 | Begin Survey of Periodic Table: Hydrogen Isotopes & Nuclear reactions | Ch24, CW: 10.1-10.4 OS: 21.1-21.3 | PNB |
| | W - 05/03 | Nuclear Radiation and Energy | Ch24, CW: 10.5-10.6 OS: 21.4-21.5 | |
| | F - 05/05 | Applications of Nuclear Chemistry | Ch24, CW: 10.5-10.6 OS: 21.4-21.5 | |
| | M - 05/08 | Oxidation-Reduction Review | Ch21, OS: 17.1-17.4 | PNB |

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|------|----------------|---|---|-----|
| Wk7 | W - 05/10 | Electrochemical Cells & Nernst Equation | Ch21, CW: 12.1-12.5 OS: 17.1-17.6 | |
| | F - 05/12 | Group 1A: Alkali Metals and Redox | Ch14, CW: 12.1-12.5 OS: 17.1-17.6 | |
| Wk8 | M - 05/15 | EXAM #2 | | PNB |
| | W - 05/17 | Group 2A: Alkaline Earth Metals | Ch14, CW: 13.1-13.4 OS: 17.1-17.4 | |
| | F - 05/19 | Group 3A Elements | Ch14, CW: 14.1-14.5 | |
| Wk9 | M - 05/22 | Group 4A Elements | Ch14, CW: 15.1-15.5 | PNB |
| | W - 05/24 | Group 5A Elements | Ch14, CW: 16.1-16.5 | |
| | F - 05/26 | Group 6A Elements | Ch14, CW: 17.1-17.5 | |
| Wk10 | M - 05/29 | Halogens | Ch14, CW: 18.1-18.5 | |
| | W - 05/31 | Nobel Gases | Ch14, CW: 19.1-19.5 OS: 9.1-9.4 | |
| | F - 06/02 | Final Review | | |
| | 06/07 - 8am | Final Exam (Cumulative) | | |

Canvas and Class Notes:

Lecture information will be presented on the board as well as PowerPoint slides. the slides will be posted on Canvas in addition to other useful learning materials including suggested problems and assignments.

PNB: Practice Notebook