

CHEMISTRY OF THE ELEMENTS
CHEM 2131
Spring, 2023

Instructor: Dr. Todd A. Wells
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Text: Chemistry, 9th Edition, Silberberg
Lectures: 12-1:50 pm, TR
Office Hours: 11-11:50 am, T (Physics 319)
10-11 am, W (Physics 319)

REQUIRED COURSE ITEMS

Textbook: *Chemistry: The molecular nature of matter and change*, 9th Edition, Martin S. Silberberg (2021) McGraw-Hill (available at the DU Bookstore). The 7th or 8th edition is also acceptable; however, a Connect Plus license from McGraw-Hill is still required.

Online Textbook and Connect, 2-year access, ISBN: 9781260477375

Loose Pages with Connect, ISBN: 9781264094202

Online Homework: A Connect OLA license is required for the course. When you purchase your textbook at the DU Bookstore, this license is included. If you already have a text, you can purchase a license directly online from McGraw-Hill. This option will be made available when you attempt the first online assignment.

If purchased separately:

Connect OLA (2 Years), ISBN: 9781264400454

Connect OLA (1 Quarter or 90 days), ISBN: 9781264400270

Connect OLA (210 Days), ISBN: 9781264400348

Calculator: A calculator with the following capabilities is required: square roots, logarithms, and exponential (scientific) notation operations.

READINGS – You have been provided a tentative lecture schedule. You should read the material and do any associated online components prior to class.

CLASS MEETINGS – For the most part we will follow the same format every week. Monday I will introduce the major concepts; these discussions will continue on Wednesday and there may be online materials used to supplement these discussions. On Tuesday, we will work on sample problems and cover questions you have from the homework. Each Friday we will wrap-up the week. Finishing any topics we need to and reviewing the material from that week. Every 3 weeks an exam will be given on Thursday.

Components – There will be three areas of this course where your learning will be facilitated using online technology.

- **In-person classes** (Tuesday and Thursday), the majority of the course material will be presented in these sessions.
- Supplementary material posted on Canvas which may include **asynchronous lectures, videos, simulations or additional reading material**.

- **Online homework** will be assigned using the Connect OLA that is linked to this course. These assignments will be graded. With the exception of the 1st and 10th week, these assignments will be due Thursday at 11:59PM (Mountain time).

EXAMS - There will be three (3) exams given during the quarter and a cumulative final exam. I do not drop the lowest exam grade. However, the final exam grade can be used to replace the lowest exam grade.

GRADES - Final grades will be determined according to your performance on the exams, online homework, and any other assignments. Cooperative learning is encouraged. As such, I will not grade on a curve. If most students do well, there will be a significant number of higher grades. The opposite, however, can also be true! Your final grade will be determined on a maximum of 1100 points with the following components:

<u>Component</u>	<u>Points</u>
Hour Exams (200 points each)	600
Final Exam	200
Online Homework	100
Total Points	900

Projected Grade Ranges

A ≥ 94%	B- ≥ 78%	D+ ≥ 64%
A- ≥ 90%	C+ ≥ 75%	D ≥ 58%
B+ ≥ 86%	C ≥ 72%	D- ≥ 55%
B ≥ 82%	C- ≥ 68%	

LECTURE AND TESTING ACCOMODATIONS - If you have a disability/medical issue protected under the Americans with Disabilities Act (ADA) and Section 504 of the Rehabilitation Act and need to request accommodations, please make an appointment with the Disability Services Program (DSP); 303.871.2372/ 2278/ 7432; located on the 4th floor of Ruffatto Hall; 1999 E. Evans Ave. Information is also available on line at <http://www.du.edu/disability/dsp>. See the Handbook for Students with Disabilities.

Any student who feels they may need an accommodation based on the impact of a disability should contact me privately to discuss your specific needs. Please contact the Disability Services Program.

If you qualify for academic accommodations because of a disability or medical issue, please submit a Faculty Letter to me from Disability Services Program (DSP) in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities/medical issues.

RELIGIOUS ACCOMODATIONS. It is University policy to grant students excused absences from class or other organized activities for the observance of religious holy days, unless the accommodation would create an undue hardship. I will do my best to accommodate your requests if you make arrangement with me *in advance* of your absence. Please examine the course syllabus, including the tentative schedule, for any potential conflicts with holy days and notify me prior to the end of the second week of classes of conflicts that may require your absence from class and/or prevent you from completing an assignment. I

have included the link to the Religious Accommodations Policy for your reference. More information can be found at http://www.du.edu/studentlife/religiouslife/DU_religious_accommodations_policy.html.

WEEK 1 – ACID-BASE THEORY AND COORDINATION CHEMISTRY

Brønsted-Lowry/ Lewis Acid-Base	Review 18.1-18.3 and 18.10
HSAB concept & coordinate covalent bonds	
Introduction to Coordination Chemistry	23.1-23.3
Coordination, Ligands, and Structure	

WEEK 2 – COORDINATION CHEMISTRY CONTINUED

Nomenclature of Coordination Compounds	23.1–23.3
Structure and Isomerism	23.1–23.3
Bonding Theories and Properties	23.4
Crystal Field Theory	23.4

WEEK 3 – COORDINATION CHEMISTRY CONTINUED

Spectrochemical Series	23.4/supplement
Crystal Field Splitting Energies	23.4/supplement
Applications of Coordination Compounds	23.4/supplement

WEEK 4 – INTERMOLECULAR FORCES: LIQUIDS

Intermolecular Forces	12.1-12.3
The Liquid State	12.4
Water	12.5

WEEK 5 – INTERMOLECULAR FORCES: SOLIDS

The Solid State	12.6
Advanced Materials	12.7
Periodic Trends	Supplement
Uniqueness principle, Diagonal Effect, Inert Pair Effect	Supplement

WEEK 6 – NUCLEAR REACTIONS

Hydrogen Isotopes	14.1
Nuclear Reactions	24.1
Nuclear Radiation and Energy	24.2-24.5

Applications of Nuclear Chemistry	24.2-24.5
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WEEK 7 – ELECTROCHEMISTRY

Oxidation-Reduction Review	21.1
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Electrochemical Cells & Nerst Equation	21.2-21.4
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Application of electrochemistry	21.5-21.7
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WEEK 8 – GROUPS 1A thru 3A

Alkali & Alkaline Earth Metals	14.4
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Group 3A	14.5
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WEEK 9 – GROUPS 4A thru 6A

Group 4A and the Carbon Cycle	14.6 & 22.2
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Group 5A Elements Nitrogen & Phosphorous Cycles	14.7 & 22.2
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Group 6A Elements	14.8
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WEEK 10 – GROUPS 7A and 8A

Halogens	14.9
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Noble Gases	14.10
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Review	
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