CHEM 31 F (93974): General Chemistry Fall 2022

I. Lecture

Lecturer: Erik Ruggles, Ph.D. **Office:** Innovation 333 or Virtual Ethereal

Email: Erik.Ruggles@uvm.edu

Office Hours: T, Th: 2:30-4:00pm for in-office hours by appointment or any time for virtual office hours by appointment using Teams. The key is to think ahead to set up these important meetings.

Class Time: T,Th: 1:15-2:30 pm **Location:** Innovation E102 and Teams

Course Objectives: To become adept in the concepts of matter, unit conversions, stoichiometry, reactions, gas laws, thermochemistry, quantum theory, atomic structure, electronic configurations, bonding and intermolecular forces. To perform experiments within these concepts to physically connect to the topic.

Textbook: There are four options to purchase **"Chemistry Structure and Properties" 2nd Ed., by Tro** (*Pearson Publishing; Full text ISBN-13: 978-0-13-429393-6*) **along with Mastering Chemistry online access**. 1) It can be purchased at an online site (~$300; text and mastering), or 2) at the UVM bookstore (~$160; text, solutions manual, and mastering), 3) digital access (~$120; etext and mastering) or 4) purchase a used textbook and MasteringChemistry (~$75 mastering separately). *The digital solutions manual will be provided for free but also comes with the UVM package and has the complete solutions to all the assigned problems.* ***The most bang for your buck is the UVM bookstore package (option 2), but the most economical (option 4).***

Assignments and Lecture: The homework assignments are broken down into Modules and can be found in BlackBoard (BB) by clicking the **2. Assignments** link. Each module contains Lecture Videos, Homework Problem Sets, and Homework Video Examples of Problems (for extra help). ***These will be assigned after each class period and you are expected to watch the lecture(s) and attempt the homework prior to the next class time***. The Lecture Videos will cover new material and concepts along with sample problem solving. The Homework Problem Sets will strengthen your connection between concept and the mathematics that describes the concept. I strongly encourage you to do as many problems as possible, as the more you practice the better you will get. Use the Homework Video Examples of Problems for extra help. Our in-class lecture notes will be posted in pdf format on BB (**4. Course Materials** link). Our in-class discussions will be recorded and posted in video format on Teams.

Class Time: Class will be held 1:15-2:30pm on Tuesdays and Thursdays. Class is meant for a quick recap on concepts followed by student led question and answers. Questions could be homework related, lecture related, exam related, etc. The homework assigned should be finished (or at least attempted) prior to class discussion as I want to use this time to clarify lecture concepts and homework problems. I will also be available by email, on Teams and on discussion boards within BB (**5. Discussion Boards** link) as much as possible for question and answer.

Office Hours: Our class time is pretty much the same as office hours. However, if you have questions outside of class, questions of a more personal nature or feel the need to meet in private then feel free to set up an individual meeting with me via email or Teams that fits both of our schedules.

Extra Practice: For added examples, blank old exams from my 2017-2019 classes, SI Sessions, as well as their answer keys are posted on BB (**4. Course Materials** link). Remember that even though questions will change from year to year, the concepts will remain the same. ***Do not study with just the old exams!*** The Meat and Potatoes, or Seitan and Broccoli, is in the Homework Problems. Also, there are homework problem videos posted on Blackboard for extra "at-home" help.

Recitations: Throughout the semester I will hold recitations on the Monday evening from 6:45-7:45 pm on Teams. The Sunday before a mid-semester exam I will hold an exam review session from 9:00-10:30 am also on Teams. ***These problem sessions are meant to address your questions about lecture topics and/or homework problem solving, so come prepared with questions.*** Review sessions will be recorded and then posted in video format on Teams and will be posted in pdf format on BB (**4. Course Materials** link).

Homework Quizzes: There will be ten graded homework quizzes (best 10 out of 12) during the semester. These assignments will occur once we finish a chapter and will be found in MasteringChemistry. To access, log in to BB and follow the **3. MasteringChemistry** link. You will have several days to complete each assignment, but I would not wait until the last moment.

Exams: The exams are scheduled to be on ***Mondays from 6:40pm-9:40pm. Your lab section designates the location of your mid-semester exams (see below).*** There are no scheduled make up dates. The three Mid-Semester Exams are the same regardless of Chem31 Section, so all Chem31 students are being tested the same. The Mid-Semester Exams are written to take 1.5 hours to compete, but every student has a full 3 hours to take the exam (*double time already provided to all, so ACCESS time accommodations not applicable*). The only exception to this is the Final Exam (*ACCESS time accommodations will be allowed*). All exams and quizzes can be accessed after their due dates for practice, save for the final exam. While I do not mind discussing the final, copies of the final exam will not be distributed. While taking the exams only non-programmable non-graphing calculators are permitted. No other electronic devices are allowed (i.e. no cell phones, mp3 players, ipods, etc.). ***Students caught using sources other than themselves as well as any other electronic device other than a non-programmable non-graphing calculator will receive a zero for the exam.***

Exam Dates:

September 19	Exam 1	**November 14**	Exam 3
October 17	Exam 2	**December 13**	Final Exam (4:30-7:15pm; Innovation E102)

Final Exam Policy: The University final exam policy outlines expectations during final exams and explains timing and process of examination period. https://www.uvm.edu/registrar/final-exams

Exam Locations (based on your lab section):

L01-L04; LZ01-LZ04; LZ53-54	Innovation E105	L32-L37; LZ32-LZ37	Williams 301
L05-L11; LZ05-LZ11	Innovation E102	L38-L43; LZ38-LZ43	Votey 105
L12-L23; LZ12-LZ23	Billings I101	L44-L50; LZ44-LZ50	Fleming 101
L24-L31; LZ24-LZ31	Rowell 103	L51-L55; LZ51-LZ52	Aiken 102

II. Laboratory

Lab Manuals: All experiments can be found online on your lab's BB website as individual pdfs. Please make sure you ***print out each experiment and bring to lab*.**

Lab Notebook: A notebook with carbon-less copies is required for recording lab data. All data is to be recorded in ink (not pencil). A carbon-less copy lab notebook can be bought at UVM's bookstore.

Safety Eye Wear: Everyone in the lab must wear OSHA approved (EZ87stamped) safety glasses or goggles once any experimentation has been started. Students not observing this rule will receive a **ZERO** for the experiment, warnings will not be given. Safety eyewear can be purchased at the UVM bookstore. ***Contact Lenses are a potential health hazard and can be worn in the laboratory only if no other types of corrective lenses are available. If you have to wear contact lenses then you must wear goggles and please let your TA know.***

Lab Attire: This is a chemical laboratory dress appropriately! It is best to wear full pants and a shirt with at least short sleeves. Shorts and short pants (capris, crops, etc.) are not allowed in the laboratory. Shirts that expose the shoulders, midriff, or back are also not allowed. Proper footwear is also necessary in the laboratory. Full shoes, preferably constructed of leather or other chemically resistant material, should be worn in when in the laboratory. Open toed shoes, open backed shoes, and shoes that expose the top or other portions of the foot are not allowed. If you arrive at lab in inappropriate attire, you will not be allowed to perform the experiment that day.

Prior to Start of Lab: Purchase your lab notebook and safety glasses. In your Lab's Blackboard review and complete the Lab Safety and Academic Integrity Modules. Prior to lab print out the experiment. ***If you have not purchased or completed these items, you will not be able to begin the lab portion of the course.***

Attendance: Students must attend the lab section they are assigned to. If more than two labs are missed, you will receive an **F** for the course. Only the academic dean of your college may grant an incomplete. An unexcused absence will result in a **ZERO** grade for the laboratory experiment. Official documentation of sickness or a family crisis is required for an excused absence. If there is a need to reschedule your lab time to one that is not your assigned time you must obtain permission from Christine Cardillo (Christine.Cardillo@uvm.edu) a week in advance.

Lab Videos: Prior to attending your lab it is mandatory to view the video that accompanies the lab. These videos demonstrate the proper use of new equipment and the safe handling of chemicals. Videos can be found at: https://www.youtube.com/channel/UC8r6fR2K-8xAtsf-_a8edMg.

Laboratory Format: Each laboratory period is scheduled for 2 hours and 45 minutes. This time includes recitation, your TA's pre-lab overview, performing the weekly experiment, lab clean-up, and lastly time for post-lab calculations. When you first arrive to lab you should turn in your pre-lab for the current week's lab, and the post-lab for the previous week's lab. The lab period will start with recitation, where you will work in groups on selected problems relating to both the current lecture and lab content. Recitation is followed by a brief pre-lab overview led by your TA, leading to the start of experimental work. All experimental work will be stopped prior to the end of the laboratory period to allow enough time for lab clean-up and proper waste disposal before leaving the laboratory. Lastly, any time left in the laboratory period should be used to get started on the post-lab calculations. Plan on being in laboratory for the full scheduled time, do not assume that you will be able to leave or get out of lab early every week.

III. Course Grade

Percent Ranges for Grades:

I cannot say in advance which point ranges correspond to which letter grades, but I will give approximate correlations throughout the semester following each of the exams. Please note that you are not competing with each other for grades in this course: if everyone scores in the "A-range," I will give everyone "A"s for the course (really!). I encourage you all to work together as you study, to help each other learn the material, but do also recognize that all graded work must be solely your own, so be prepared to work independently to demonstrate your mastery of the material.

How to Calculate Your Points:

1) Class = **750 total points** (75% of grade; exams and homework)

1a) Mid-Semester Exams = **375 points** (125 points/exam)

1b) Homework = **125 points** (12.5 points/assignment)

1c) Final Exam = **250 points**

There are three mid-semester exams (each 125 points) and a final exam (250 points). If your final is your lowest grade it will count only as one unit. If one of the mid-semester exams is your lowest grade, then your final will count as two units. The lowest mid-semester exam grade will be replaced by the percentage on the final. If you are absent from an exam official documentation of sickness or family crisis is required or you will receive a **ZERO** for the exam. Students with legitimate excuses will be permitted to take the exam early. Except in very unusual circumstances makeup exams will not be administered after the scheduled exam time.

Example 1:	Exam 1	Exam 2	Exam 3	Final
Actual Scores:	106.25 (85%)	56.25 (45%)	97.5 (78%)	187.5 (75%)
Counted Scores:	106.25 (85%)	93.75 (75%)	97.5 (78%)	187.5 (75%)

Homework Score: 105.0 (84%) Class Points = 485.0 exam + 105.0 homework

Total = 590.0 points

Example 2:	Exam 1	Exam 2	Exam 3	Final
Actual:	87.5 (70%)	97.5 (78%)	95.0 (76%)	170.0 (68%)
Counted:	87.5 (70%)	97.5 (78%)	95.0 (76%)	170.0 (68%)

Homework Score: 87.5 (70%) Class Points = 446.25 exam + 87.5 homework

Total = 537.5 points

2) Laboratory = **250 lab points** (25% of grade)

Lab Safety Quiz:	Passing grade required **BEFORE** the first lab.	
Pre-Lab Questions:	(10 x 8 points)	80 points
Technique:	(10 x 3 points)	30 points
Post-Lab Calculations & Questions:	(10 x 14 points)	140 points
		250 points

3) Course Grade Determination

Add up your points from class and lab and then use the chart at the beginning of this section to determine your course grade.

Example 1:

590.0 class points

\+ 200 lab points

790.0 total points/1000 points = 79.00%

Example 2:

537.5 class points

\+ 200 lab points

737.5 total points/1000 points = 73.75%

To summarize:

[(Ex1 + Ex2 + Ex3 + Final + Homework + Lab = Total Points

(Total Points)/1000] x 100 = Total Percent

Academic Integrity

Offenses against the Code of Academic Integrity (i.e. cheating) are deemed serious and insult the integrity of the entire academic community. Any suspected violations of the code are taken very seriously and will be forwarded to the Center for Student Ethics and Standards for further investigation.

http://www.uvm.edu/policies/student/acadintegrity.pdf

IV. Tentative Lecture Schedule and End-of-Chapter Homework

Dates	***Chapters***	***Homework Problems (Learning Objectives)***
Aug 29 - Sept 2	Syllabus	(Class Dynamics)
	E	ChE: 19,21,23,25,27,29,33,37,39,41,45,47,49,51,53, 55,59,61,65,71,73,75,79,81,87,89,91,95,99, (ModuleE: Dimensional Analysis, Conversions, Significant Figures and Density)
	1	Ch1: 35,39,43,45,49,53,55,57,59,61,63,65,67,71,75, 77,79,83,85,87,89,91,93,97,103,105,107,109,117, (Module1: History and Current Understanding of Atoms, Elements and Molecules, The Mol)
Sept 5	**LABOR DAY HOLIDAY**	
Sept 6 - 9	1 and 2	Ch2: 35,37,39,41,43,51,53,55,57,59,61,63,65,67,69, 71,73,79,85,89,91 (Module2: Light, Energy and Fireworks, Quantum Mechanical View of the Atom)
Sept 12	**LAST DAY TO ADD/DROP COURSE**	
Sept 12 - 16	2	
Sept 19	**EXAM 1****	**Chapters E, 1, and 2****
Sept 20 - 23	3	Ch3: 41,43,45,47,49,51,53,55,57,59,61,63,65,67,69, 71,73,75,77,79,81,83,87,89,91,93,95,97,101,103,109, 115,127,135 (Module3: Electron Configurations and Periodic Trends)
Sept 26 - 30	4	Ch4: 29,31,33,35,37,39,43,45,47,49,51,53,55,57,61, 63,65,67,69,71,75,77,79,83,87,93,95,97,101,103,105, 109,111,117,119,121,123,125,127,137 (Module4: Molecules and Molecular Molar Mass, Nomenclature and Determination of Molecular Formulas.

**Extent of exam material will depend on our progress in lecture.

Dates	Chapters	Homework Problems (Learning Objectives)
Oct 3 - 7	4 and 5	Ch5: 23,25,27,29,31,35,37,41,43,45,47,49,51,53,55, 57,59,61,63,65,69,71,73,75,79,81,83,85,91,95,97,99, 101 (Module5: Bonding, Resonance, Lewis Octet Theory, VSEPR Theory, Molecular Shape and Polarity)
Oct 10 -14	5	
Oct 14	**Fall Recess**	
Oct 17	**EXAM 2****	**Chapters 3, 4, and 5****
Oct 17 - 21	11	Ch11: 35,37,39,41,43,45,47,49,51 (Module11a: Forces of Attraction and the Physical Properties they control)
	6	Ch6: 25,29,31,33,35,39,41,43,45,49,51,53,55,57,59, 61 (Module6: Valence Bond Theory and Molecular Orbital Theory)
Oct 24 - 28	6 and 7	Ch7: 15,17,19,21,23,25,27,29,31,33,35,37,39,41,43, 45,47,49,53,55,57,61,63,65,67,69,71,75,81,85 (Module7: Chemical Reactions, Balancing, Stoichiometry, Limiting Reagent, Theoretical Yield and Percent Yield)
Oct 31	**LAST DAY TO WITHDRAW FROM COURSE**	
Oct 31 – Nov 4	7 and 8	Ch8: 21,23,25,27,29,31,33,35,37,39,41,43,45,47,49, 51,53,55,57,59,61,63,65,67,69,71,73,75,77,79,81,87, 91,93,99 (Module8: Solution Concentration, Aqueous Reactions, Precipitation, Acid-Base, Gas-Evolution and Reduction-Oxidation Reactions)
Nov 7 - 11	8 and 9	Ch9: 31,33,35,37,39,41,43,45,47,49,51,53,57,59,61, 63,65,67,69,71,73,75,77,79,81,83,85,87,89,91,93,95, 99,101,107,111,113,117,119,123 (Module9: Thermodynamics, Calorimetry and Enthalpy)

**Extent of exam material will depend on our progress in lecture.

Dates	Chapters	Homework Problems (Learning Objectives)
Nov 14	**EXAM 3****	**Chapters 6, 11, 7, 8, and 9****
Nov 14 - 18	9	
Nov 21 - 25	**THANKSGIVING HOLIDAY**	
Nov 28 – Dec 2	10	Ch10: 25,29,31,33,35,37,39,41,43,45,47,49,51,53,55, 57,59,61,63,67,69,71,73,77,79,81,83,85,87,89,91,93, 95,99,101,105,107,113,123,125,127 (Module10: Simple Gas Laws and Ideal Gas Law, Dalton's Law of Partial Pressures, Gas-Reaction Stoichiometry and Real Gases)
Dec 6 - 9	10 and 11 Review	Ch11: 53,57,59,61,63,65,67,69,71,73,77,81,85,87,93 (Module11b: Temperature Dependence, Vapor-Pressure Heating Curve for Water and Phase Diagrams)
Dec 13	**Final Exam**	**Cumulative** (4:30-7:15pm; Innovation E102)

**Extent of exam material will depend on our progress in lecture.

V. Laboratory Schedule

Date	Experiment	Description
Aug 29-Sept 9	No Lab	Purchase lab notebook and safety glasses. On Blackboard, review lab \ syllabus and schedule.
Sept 12-16	**Check In**	On Blackboard, review and complete the Safety Presentation and Safety Quiz
Sept 19-23	Experiment 1 Lecture Correlation	Density Determination Module E and Module1
Sept 26-30	Experiment 2 Lecture Correlation	Flame Emission Spec of Metals Module2
Oct 3-7	Experiment 3 Lecture Correlation	Ionization Energy/Atomic Radius Module3
Oct 10-14	Experiment 4 Lecture Correlation	Determination of a Chemical Formula Module4
Oct 17-21	Experiment 5 Lecture Correlation	Chemicals Models (VSEPR) Module5
Oct 24-28	Experiment 6 Lecture Correlation	Intermolecular Forces of Attraction Module6 and Module11
Oct 31-Nov 4	Experiment 7 Lecture Correlation	Chemical Reactions Module8
Nov 7-11	Experiment 8 Lecture Correlation	Acid Titration of a Food Product Module8
Nov 14-18	Experiment 9 Lecture Correlation	Heat Capacity of a Calorimeter Module9
Nov 21-25	**Thanksgiving Holiday**	
Nov 28-Dec 2	Experiment 10 Lecture Correlation	Gas Law Determination of MW Module10
Dec 5-9	**Lab Clean Up and Check Out**	

VI. ACCESS Accommodations

Student Learning Accommodations Statement

In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact ACCESS, the office of Disability Services on campus. ACCESS works with students to create reasonable and appropriate accommodations via an accommodation letter to their professors as early as possible each semester.

Contact ACCESS: A170 Living/Learning Center - 802-656-7753 - access@uvm.edu.

ACCESS Office: http://www.uvm.edu/~access/

Policy on disability certification and student support:
http://www.uvm.edu/~uvmppg/ppg/student/disability.pdf

VII. Religious Holidays

Religious Holiday Policy Statement

Religious Holidays: Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time.

https://www.uvm.edu/registrar/religious-holidays

VIII. Illness Accommodations

The Center for Health and Wellbeing does not provide students with notes verifying medical illness. This approach makes the best use of their limited medical resources by not having students who are required to provide verification of a recent illness utilize appointment times which can be used for students who require evaluation and therapy. Instead, contact your college's Dean's office so they can report your illness to all of your professors.

When students experience a serious illness requiring hospitalization or when an extended absence from class is foreseen, a Center staff member will (with the student's permission) notify the Dean's Office of the student's College or School so that faculty members can be made aware and the student supported in working successfully through the absence.

IX. COVID-19 Accommodations

Due to COVID-19 we advise that a student feeling any symptoms should get checked out before attending an in-person class. Keep in mind that if a student attends an in-person class and tests positive for COVID-19 that they are putting other students at risk and their possibly quarantine as well. When in doubt, go get tested. The **Green and Gold Promise** clearly articulates the expectations that UVM has for students, faculty, and staff to remain compliant with all COVID-19 recommendations from the federal CDC, the State of Vermont, and the City of Burlington. This include following all rules regarding facial coverings and social distancing when attending class. If you

do not follow these guidelines, I will ask you to leave the class. **The Code of Student Conduct** outlines policies related to violations of the Green and Gold Promise. Sanctions for violations include fines, educational sanctions, parent notification, probation, and suspension.

X. Health & Safety

The University of Vermont's number one priority is to support a healthy and safe community:

Center for Health and Wellbeing: https://www.uvm.edu/health

Counseling & Psychiatry Services (CAPS): Phone: (802) 656-3340

C.A.R.E.: If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by visiting the Dean of Students website at https://www.uvm.edu/studentaffairs

Alcohol and Cannabis Statement: As a faculty member, I want you to get the most you can out of this course. You play a crucial role in your education and in your readiness to learn and fully engage with the course material. It is important to note that alcohol and cannabis have no place in an academic environment. They can seriously impair your ability to learn and retain information not only in the moment you may be using, but up to 48 hours or more afterwards. In addition, alcohol and cannabis can:

- Cause issues with attention, memory and concentration
- Negatively impact the quality of how information is processed and ultimately stored
- Affect sleep patterns, which interferes with long-term memory formation

It is my expectation that you will do everything you can to optimize your learning and to fully participate in this course.

XI. Diversity, Equity and Inclusion:

The Division of Diversity, Equity, and Inclusion believes excellence should be inclusive of the entire University of Vermont (UVM) community and is steadfastly committed to this belief. Every day, our Division strives to make our work accessible, affirming, and action-oriented to help ensure excellence is inclusive of everyone. https://www.uvm.edu/diversity

Interfaith Center: Each of us engages those questions differently, perhaps through a religious tradition, philosophy, or spiritual practice. No matter how you make meaning of your life, you are welcome at the Interfaith Center for reflection, spiritual practice, education, and community building. https://www.uvm.edu/interfaithcenter

Mosaic Center for Students of Color (MCSC): MCSC's vision is to create a diverse and rich community of empowered, engaged, and enthusiastic students of color at UVM. We fully support the holistic development of self-identified students of color so that they can obtain their goals for academic achievement, personal growth, identity formation, and cultural development. https://www.uvm.edu/mcsc

Prism Center: The Prism Center serves the diverse queer and trans communities at the University of Vermont. We support and empower lesbian, gay, bisexual, transgender and queer students, as well as students whose identities fall in between or expand beyond those categories, and work to create a campus community where people of all sexual and gender identities can thrive.
https://www.uvm.edu/prism

UVM Women & Gender Equity Center: The equity center cultivates joyful community while advancing gender equity across identities. We envision a brave, diverse, and equitable learning environment for all members of the UVM community. We provide advocacy services for those in our community who have experienced sexual or intimate partner violence, and strive to provide programming, education, and events that ask our community to explore the intersections of their gender and other identities. https://www.uvm.edu/wagecenter

XII. Grade Appeals

If you would like to contest a grade, please follow the procedures outlined in this policy:
https://www.uvm.edu/policies/student/gradeappeals.pdf

For information on grading and GPA calculation, go to https://www.uvm.edu/registrar/grades

XIII. FERPA Rights Disclosure

The purpose of this policy is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.
http://catalogue.uvm.edu/undergraduate/academicinfo/ferparightsdisclosure/