



CHE 1031: General Chemistry I

Spring 2020 Syllabus

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Meeting times:

Lecture: T,Th 10:50 am – 12:05 pm in GRE224;

Recitation: T 5:00 – 5:50 pm, Th 4:00 – 4:50 pm in MOR202

Lab: T 2:00 – 4:50, Th 1:00 – 3:50 pm in MOR 123

Moodle: Note that Canvas links to my own course web site where most material are posted:

<https://richmond-hall.weebly.com/che-1031.html>

Office hours: See my schedule at <http://richmond-hall.weebly.com/contact--schedule.html>.

Mailbox: in the Green Hall Faculty Lounge

Course objectives:

This course is intended for Engineering students and consists of the fundamentals of general and physical chemistry. Laboratory work is designed to give students hands-on experience with principles discussed in the lectures, provide an introduction to laboratory techniques, and introduce some methods of analysis currently used in the industry.

Course outcomes:

This course serves to satisfy Student Learning Outcomes for the Civil and Environmental Technology, Architectural Engineering Technology, and Renewable Energy Technology Programs. These outcomes include:

- Mastery of general chemistry knowledge, techniques, skills and tools
- Ability to conduct, analyze, and interpret experiments
- Effective oral, written, and team communication skills
- Effective scientific and quantitative reasoning and problem-solving skills appropriate to the student's program field
- Effective qualitative and algorithmic reasoning skills

Required text:

- Flowers, Theopold, Langley & Robinson (2019) **Chemistry 2e**, OpenStax, ISBN: 978-1-947172-61-6
This text is an Open Educational Resource & is available as a free pdf.
- CHE 1031 Laboratory Manual (provided by the Science Department)



Also required:

- Laboratory notebook with sewn binding
- Calculator capable of scientific notation and exponents

Suggested:

- Whiteboard notebook with erasable colored markers
- Three-ring binder with graph paper for note-taking

Study and work expectations:

Students enrolled in college courses should expect to spend 2 hours working on the course for every hour in the classroom or lab. This course meets for six hours a week, so expect to spend at least an additional twelve hours reading the text or lab manual, reviewing and summarizing notes, listing questions, completing homework problems, take-home quizzes, finishing lab calculations, writing lab reports and studying for exams.

Assignments

Homework:

Homework will be assigned in class and posted on my Weebly site and linked to Canvas. All assignments are to be completed by the due date and must be submitted prior to, or at the beginning of, class. Late assignments will be reviewed but will be graded as zero. Homework solutions will be posted as graded homework is returned. Scans (but not photographs) of homework submitted on time will be accepted if you cannot attend class. If you will miss class for more than a day, contact me so that we can make arrangements for you to complete assignments. I will drop the lowest homework grade of the semester even if it is a zero.

Homework format:

Please submit homework on green engineering graph paper. Number each problem and box the answer. Please show all work for full credit.

Labs and lab reports:

Lab result summaries, reports or exercises are due by midnight one week after lab, at the next lab meeting. Work may be submitted in lab, in my mailbox or at my office, or electronically through Canvas as a Word document. Reports are accepted for no more than two days after due; grades drop by 3.3 points per day when late. Lab quizzes are worth 5 points on the reports. See the posted report format.

Please note that we have only one lab section this semester. As a result, making up labs will be challenging at best. You must notify me, in advance, if and why you cannot attend.

Recitations:

Recitations meetings are mandatory. I will assign a few recitation-specific assignments, but recitation meeting will frequently give you a chance to do homework or lab reports and ask for help as you work. If you are caught up on all assignments, you may be excused.

Quizzes:

All quizzes are given during recitation, after a brief review. I allow a brief open-note 'magic moment' when you may refer to notes that you have taken.



Exams:

You may bring calculators and notes on one side of a 3”x5” notecard to hourly exams. The final exam is cumulative, with one section corresponding to each hourly exam.

Grading scheme:

I post grades on Canvas. All assignments will be announced in class and posted on my Weebly site and linked through Canvas. I give partial credit on all assignments. Students are responsible for keeping all graded material until final grades are in so that we can resolve any grading disputes.

Hourly exams*	40%
Final exam*	10%
Quizzes**	10%
Lab quizzes / reports	20%
Homework / recitation**	20%

* Exam grade replacement policy: Grades on hourly exams can be replaced by grades on the corresponding section of the final exam. Grade replacement will occur when the grade on the corresponding section of the final exam is higher, but not when it is lower.

** The lowest homework graded, even a zero, will be dropped. The lowest quiz grade will be dropped unless that lowest grade is a zero.

A+	A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F
97-	93 -	90 -	87 -	83 -	80 -	77 -	73 -	70 -	67 -	63 -	60 -	< 60
100	96.9	92.9	89.9	86.9	82.9	79.9	76.9	72.9	69.9	66.9	62.9	

Attendance:

On-time attendance is expected. I report excessive absences through the college’s academic alert system and as part of academic warnings. Students missing class are responsible for material covered and any information provided (get handouts from a classmate or the course website). Unexcused absences will not be allowed to make up missed exams or quizzes and will receive a failing grade. **If you will be or were absent on the day of an exam, you must contact me in writing and request a make-up exam).** Only excused absences will be allowed the opportunity for a make-up exam.

Communication:

My official course-related communication will be via your official college email address. You are responsible for regularly reviewing email as important course information may be delivered this way. If you use your own e-mail system, arrange to have your college email forwarded. See IT or <http://support.vtc.edu> for assistance.

Cell phones:

Cell phone use is strongly discouraged. I collect cell phones at the beginning of all class meetings but will make exceptions if necessary.

Focus on learning:

During class, recitation and lab sessions our focus must be learning. Please respect this focus. If I find that your behavior is preventing others from focusing on learning, I may ask you to leave. Please let me know how I can help you focus and succeed in the course.



Academic integrity:

Students are expected to practice academic honesty, understand and abide by Vermont Technical College's Policy on Cheating and Plagiarism (T107). I expect students to prepare and submit their own work for all assignments, including lab reports. You are welcome to work in groups or with tutors, but all work you submit must be demonstrably your own. If there is any question regarding the appropriateness of collaborating on homework or projects, check with me before the assignment is due.

<https://www.vtc.edu/my-vermont-tech/my-vtc-home/policies-procedures>

If you need help with this course:

Students having problems with course material should feel free to talk with the instructor. In addition, if anything regarding the classroom environment interferes with a student's learning experience, it should be brought to the attention of the instructor. Students experiencing any special difficulties should take advantage of recitation hours and my office hours, and should feel free to schedule extra hours with me or with tutors available at the Center for Academic Success.

<https://www.vtc.edu/my-vermont-tech/my-vtc-home/center-academic-success>

Disabilities and accommodations:

Anyone who feels they may be eligible for an accommodation based on the impact of a disability should contact me to arrange an appointment to discuss the course format and the sort of supports that may be needed. I rely on the Learning Specialist's office for assistance in verifying the need for accommodations and developing accommodation strategies. If you have not contacted the Learning Specialist, I encourage you to do so. Robin Goodall is available in the Center for Academic Success (Conant 224), ext. 7-1278, or by email at rgoodall@vtc.edu.

<https://www.vtc.edu/my-vermont-tech/my-vtc-home/center-academic-success>

Title IX / Policy 311:

The Vermont State Colleges System is committed to ensuring our campuses are safe places for students and employees. Faculty and staff are considered mandated reporters when it comes to experiences of interpersonal violence (sexual assault, sexual harassment, dating/domestic violence, and stalking). Disclosures of interpersonal violence will be reported to the Title IX Coordinator, who can help provide support and academic accommodations for students who have been impacted.

I will seek to keep information you share with me private to the greatest extent possible. However, I am required to report incidents of interpersonal violence of which I am made aware. An important exception to the reporting requirement exists for incidents that are shared as part of an academic project or assignment.

More information can be found online at More information can be found online at

<https://resolve.vsc.edu/>



Week	Day	Module
1	Essential knowledge: science, matter, measurements & conversions	
	1	Syllabus, science & chemistry 1
	2	Matter & measurement 1
	3	Sig figs, uncertainty, dimensional analysis 1
	<i>Lab</i>	<i>Lab safety training</i>
2	Atoms, molecules & ions	
	4	Atomic theory, structure & symbolism 2
	5	Chemical formulas & the periodic table 2
	6	Molecular and ionic compounds & naming 2
	<i>Lab</i>	<i>Density; Total solids determination; Naming chemical compounds</i>
EXAM 1: introduction through naming		
3	Composition of substances & solutions	
	7	Formula (molar) mass & the mole concept 3
	8	Determining empirical & molecular formulas (% composition) 3
	9	Molarity & other measurements of solution concentration 3
	<i>Lab</i>	<i>Hydrated salts and empirical formula determination</i>
4	Stoichiometry of chemical reactions	
	10	Writing & balancing chemical equations 4
	11	Precipitation reactions 4
	12	Neutralization reactions 4
	<i>Lab</i>	<i>Chalk: precipitation and limiting reactions lab</i>
EXAM 2: Composition through exchange reactions		
5	Stoichiometry of chemical reactions (cont'd)	
	13	Redox reactions and oxidation numbers 4
	14	Reaction stoichiometry 4
	15	Limiting reactions and reaction yields 4
	<i>Lab</i>	<i>Acid strength and titration</i>
6	Quantitative chemical analysis to electrochemistry	
	16	Quantitative chemical analysis 4
	17	Quantitative chemical analysis, cont'd 4
	18	Balancing redox half-reactions 5
	<i>Lab</i>	<i>Antacids and back-titration; BOD 7 and Winkler titration</i>
7	Electrochemistry	
	19	Standard reduction potentials, galvanic (voltaic) cells 5
	20	Batteries and fuels cells 5
	21	Corrosion 5
	<i>Lab</i>	<i>Oxidation of Mg; Testing voltaic cells</i>
8	Electronic structure & periodic properties of elements	
	22	Electromagnetic energy & the Bohr model 7
	23	Quantum theory & electron configuration 7
	24	Periodic variation in elemental properties 7
	<i>Lab</i>	<i>Electron configuration worksheet; Line spectra and flame test</i>



9	Chemical bonding	
25	Ionic bonding vs. covalent bonding	8
26	Electronegativity & bond polarity	8
27	Lewis symbols & structures, formal charge, resonance	8
	<i>Lab</i> Lewis dot structure WS	

EXAM 3: Redox through bonding

10	Thermochemistry	
19	Energy basics	6
20	Calorimetry	6
21	Enthalpy	6
	<i>Lab</i> Hess's Law	

11	Kinetics	
31	Reaction rates & factors	10
32	Rate laws	10
33	Collision theory & reaction mechanisms	10
	<i>Lab</i> Clock reaction	

12	Kinetics → Fundamentals of equilibrium	
34	Catalysis	10
35	Chemical equilibria	11
36	Equilibrium constants	11
	<i>Lab</i> Kinetics of sulfur precipitations	

13	Fundamentals of equilibrium	
37	Application of equilibrium constants	11
38	Le Châtelier's principle	11
39	Equilibrium calculations	11
	<i>Lab</i> Equilibrium and Le Châtelier's principle	

EXAM 4: Thermochemistry, kinetics and equilibrium

14	Spillover and review (Gas chemistry if time permits; otherwise addressed in lab)	
40		
41		
	<i>Lab</i> Review for final exam	

15 CUMULATIVE FINAL EXAM

[NOTE: The instructor reserves the right to change the syllabus at any time.]