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Inclusion in science: In the Department of Chemistry, we have agreed that sharing our thoughts on inclusive science is important as a part of our on-going commitment to equity in access and improving diversity throughout our field.

Here are my thoughts: First, you are welcome and belong in this class and in chemistry. Science *should* be inclusive because the activity itself is identity independent. Sadly, that is not true because people do science, and our disciplines have been built on privilege that has impacted access to education, information, resources, opportunity, and voice.

My education is a result of privilege and came at a time when science successfully dismissed inclusion (i.e., 'science is blind' baloney). Therefore, I am on learning curve for creating and supporting an inclusive scientific enterprise; I seek input and accept feedback on how to do that better. Nevertheless, I value all identities including race, ethnicity, sex, gender identity, ableness, nationality, sexual orientation, religion, economic status, age, among others, and I value how diverse groups of people and perspectives enrich our lives and, more germane, science. Data shows that diverse teams solve problems better, and anything short of inclusion fails to meet our goals as a university and science's aim to solve problems.

I am committed to doing right by you and making this class welcoming and supportive of all. Please share with me directly or through an ally, if you need to be anonymous, if that is not the case. I am prepared to learn and do better, and I will not tolerate deliberate exclusion. UVM provides us a starting point about what an inclusive environment looks like in Our Common Ground.

Safety: This is a laboratory course. Our first priority is to ensure our personal safety as well as that of our community members. We will review safety protocols and procedures in the first week of lab before experimentation starts. Part of our effort is to teach you to think about hazards and risks to be aware of how to mitigate and avoid them.

Meeting time: Per section, all on Thursdays.

Office hours: Fridays, 12:00–2:00 PM, and always feel free to make an appointment. As an introduction, office hours are your time. I will be in my office and available to meet, no appointment or notice needed. Just stop by.

Please note: If you prefer engage remotely (phone, Teams), and I am always happy to have a virtual meeting.

Teaching assistants

The course has two teaching assistants who are present in the laboratory to maintain a safe environment. They also will be aiding in assessing the first three criteria of the course. Most important, both are Ph. D. candidates in the department, each with multiple publications. You have a good deal to gain by engaging with your TA about chemistry in general and their professional experience as much as course material. Their office hours will be by appointment. Please contact them by email for a meeting.

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Required Course Materials: There is reading associated with this course, and that will be provided in class or via Brightspace. Expect reading on a weekly basis.
Any laboratory course at UVM has required materials, and **the most important is your personal protective equipment** (PPE). You will need safety glasses and a lab coat, which are shared with CHEM 1500 laboratory, both of which can be found at the Bookstore. If you choose to obtain these from another source, they must be complaint with UVM's policies for PPE.

You will also need a laboratory notebook. Like your PPE, this can be shared with CHEM 1500. Laboratory notebooks need numbered pages and have duplicate ("carbonless") copy pages to be turned in at the end of each session. Such notebooks can also be obtained at the Bookstore. We will discuss laboratory notebooks in lab.

Course description:
This course is deliberately co-required with CHEM 1500 to solidify your fundamental understanding of key chemical concepts (i.e., "general chemistry") as you begin to proceed to a disciplinary discovery process through your major. While we teach many courses from the lens of a traditional subdiscipline, such as organic chemistry or physical chemistry, the work of chemists (and biochemists) are a mix of three activities: make, model, and measure. In this course, we will do a little of all three things, but the activities will jump off from my main domain in chemistry, make.

Overall, we would like CHEM 1410 to set you up for future success. We will explore some ideas that may have been underemphasized in your high school experience that will be useful throughout your education. The context will be in exploring some reaction chemistry of transition-metal compounds, specifically some fundamental organometallic compounds. In that work, we perform some known transformations to make compounds that were originally prepared almost five decades ago. These preparations have not been revisited since and they have not been optimized for a teaching environment. We will talk about why that is meaningful, and what useful contributions you can have in performing those transformations. We will try some variations on the literature reactions that may yield new compounds. To the extent we may prepare new compounds in the lab, we will need to determine their composition and structure, core questions in molecular science, and would answer my Dad's old question of, "if you can't see *molecules*, how do you know what you made?" The answer to that question leans heavily on general chemistry ideas, but it is much more useful to think about how you can use them to answer questions—other than on exams!

The second component of the course will tap into your most adventurous and creative spirit: We will perform research. Making compounds can be research, but our effort will be more focused on specific questions, running ON curiosity and perhaps a little luck. We will ask two different, significant questions across the three sections of CHEM 1410 and see what answers we can find. These will be questions of current interest in chemistry, and if we can obtain high quality, reproducible results, your work may be a part of peer-reviewed publication. Naturally, we would give credit where it is due if this happens.

Therefore, a student successfully completing CHEM 1410 should be able to

1. Execute new reactions and procedures in a safe and reproducible manner.
2. Identify risks and hazards in the chemical laboratory and apply rational strategies to mitigate them.
3. Formulate a testable hypothesis and execute experimentation to test this hypothesis.
4. Make observations of chemical reactions and collect reliable data.
5. Report on data and observations verbally and in written form.
6. Articulate questions about chemical concepts.

Research is not a solo operation. Unfortunately, we have aggrandized individuals, often ignoring contributions of others, to tell an individualistic story of research. Because the cannon of scientific understanding is built on past discovery, all science is a team sport. In modern times, the most interesting and pressing questions are too complex for individuals to answer alone. It is essential that you approach this class, your learning in chemistry, and science ready to be part of a team. As such, it is critical that everyone can share ideas and are respectful of each other and different opinions and interpretations. Everyone's contribution is of value. So much of science is interpretation rather than being right—all voices must be heard.

Literature analysis: We will start to look at the chemical literature and use it as tool to our advantage. A major pitfall for new chemists is the assumption that all published work is of high value and utility solely because it is published. Practicing chemists must make value judgements about what data they encounter. We will look at the literature for what it can tell us and be prepared to question what we read.

We will discuss what the chemical and scientific literature is and isn't, how to access it, and start you on a process to being able to use it to your advantage.

Plagiarism: We will have a group discussion on the idea of plagiarism in class. While we are looking for you to provide some critical analysis, it is essential that you cite all ideas, content, and images that you use and that you conform to UVM standards for academic honesty. You will also be asked to write reflections. These are your own work, and must be composed on your own. We will also talk about the ethics (or lack thereof) of using AI or other tools to generate words when you should.

Grading: Your performance in this course will depend on four weighed factors:

1. **Attendance, 20%.** This is a laboratory course, and you need to be present to perform experiments, collect your data, and interact with your colleagues. Per department policy, missing more than two laboratory sections, regardless of reason, results in failure.

2. **Laboratory notebook, 30%.** You are expected to plan your work in advance in your notebook,* then use this tool to document your work, note observations, and compile data. We will talk about developing a high-quality notebook.
3. **Participation, 10%.** The class will be discussing various ideas and developing plans, particularly in asking new questions. Every member of the class is expected to participate in these discussions. An active participant in the class is also attentive to lab activities, active in lab work, and conducts their lab work safely.
4. **Reflections, 40%.** I will prompt you to reflect on the experimental work in lab, before or after it is done, aspects of the science at hand, or related topics in the course through reflections that will be assigned and due by the beginning of the following lab. These may appear up to weekly for the course, and selected examples are shown in the schedule. The clarity, quality or writing, and content will be key factors in evaluating reflections. These will typically be assigned with an upper limit for length. I will not be grading by volume!

*Lack of advanced planning can put you or your labmates at risk. Students who cannot provide evidence of advanced preparation for safe experimental work may be expelled from the laboratory.

To start, I will use the following scheme to determine course grades. A = 93-100%, A- = 90-92%, B+ = 87-89%, B = 83-86%, B- = 80-82%, C+ = 77-79%, C = 73-76%, C- = 70-72%, D+ = 67-69%, D = 63-66%, D- 60-62%, F < 60%.

These absolute percentage bins can be problematic. I assure you now that students who are safely active in lab, keep good notes and records, and are thoughtful in their reflections will perform well in the course. Therefore, I may change the bins to make sure students who meet those criteria are rewarded with appropriately high grades.

Late policy: Work turned in within 24 hours of the due date will be given 50% credit and after 48 hours no credit. I will accept and read work after 48 hours: Feedback on your writing is critical for this course and (more importantly) your development as a student and professional.

All items are due in class (at start) unless otherwise noted.

Course Schedule

Week	Topic/*assignment (tentative)*
1	Safety, laboratory introduction, chemical literature, course plans
2	ACS general chemistry examination; *reflection on Werner*
3	Metal carbonyl compounds, part 1
4	Metal carbonyl compounds, part 2; *reflection on carbonyl reactions*
5	Organic exam – no lab
6	Metal carbonyl compounds, part 3; *reflection on carbonyl reactions*
7	Metal carbonyl compounds, part 4
8	Research project, part 1; *reflection on research reading*
9	Organic exam – no lab
10	Research project, part 2; *final reflection on carbonyl reactions*

11	Research project, part 3
12	Research project, part 4; *reflection on research reactions*
13	No class—Thanksgiving recess
14	Organic exam – no lab
15	Research project, part 5*; reflection on literature*
Exam week	No lab; *final reflection on research reactions*

The instructor reserves the right to make changes, with notice.

CHEM 1410 Supplement: Support information and policies

Fall 2023

Technical support for students

Please read this technology check-list to make sure you are ready for classes.
https://www.uvm.edu/it/kb/student-technology-resources/
Our class does not use specialty software, but routine internet access on an updated browser and MS Teams are essential.
Students should contact the Helpline (802-656-2604) for support with technical issues.

Attendance Policy and Classroom Environment Expectations:

Students are active participants in class. Those who chose not to attend or participate suffer in their learning, which typically translates to lower performance in the course. Therefore, I do not measure active participation in class or attendance. However, if significant absence or non-participation occurs or those choices adversely impact the learning environment, I reserve the right to impose academic penalty after notice. In all cases, UVM's attendance policy holds.

For a laboratory course, safety is our top priority. Students will demonstrate appropriate conduct in the laboratory and in handling all reagents. If an individual or individuals choose not to adhere to UVM, department, or course safety policies, they will be asked to leave the laboratory. Ceasing experimental work creates an academic punishment, but purpose of such dismissal is to minimize potential harm to the student, peers, and academic staff. Individuals who consistently violate safety protocols will be subject to disciplinary procedures based on the code of conduct..

The classroom space will have discussions on the content of the course and the context in which that content was generated. As a learning community we will seek to encourage and appreciate expressions of different ideas, opinions, and beliefs in the spirit of Our Common Ground. Meaningful and constructive dialogue is encouraged in this class. This requires mutual respect, willingness to listen, and open-mindedness to opposing points of view. Respect for individual differences and alternative viewpoints will be maintained at all times in this class. Conduct that substantially or repeatedly disrupts the ability of faculty and instructors to teach and the ability of students to engage may result in my asking a student to temporarily leave the

classroom. The UVM Code of Classroom Conduct will be maintained by all students.

Attendance and illness/isolation/quarantine:

I fully support you in taking care of yourself and supporting the health of the community. Any student may be unable to attend class due to illness. I have some mechanisms in place to accommodate for this, but for me to fully accommodate, I need to you to contact me in advance with any challenges in attendance or coursework. Please use all available resources to ensure your mental and physical health. Should a significant issue arise, a medical provider should inform the Dean's office, which will share that a medical issue has occurred but no personal details. I never need to nor will ask for any details of your medical history.

Intellectual Property Statement/Prohibition on Sharing Academic Materials:

Students are prohibited from publicly sharing or selling academic materials that they did not author, which can include the class syllabus, outlines or class presentations authored by the professor, practice questions, text from the textbook or other copyrighted class materials, etc., and students are prohibited from sharing assessments such as homework assignments or a take-home examination. Violations will be handled under UVM's Intellectual Property policy and Code of Academic Integrity.

Brightspace, MS Teams, or other course sites:

Course materials will be on Brightspace with some assignments being uploaded there. I will communicate by email. I am available on MS Teams, but we would only use our class channel in the event an in-person meeting is canceled.

Academic Integrity and AI:

The Academic Integrity policy addresses plagiarism, fabrication, collusion, and cheating. None of these behaviors will be tolerated.

Assignments will be completed by the students registered in this course. This includes drafting text for assignments. We will discuss AI in class, but the use of AI as well any other source of content other than yourself is a disservice to yourself and counter to your aims in seeking a degree.

Lived Name and Pronoun Information

The UVM Directory includes fields for indicating your lived name and your pronouns. Lived names (preferred names, names in use) are names that an individual wants to be known by in the University community. Entering your pronouns is strongly encouraged to help create a more inclusive and respectful campus community. To update your information, login to the UVM Directory. A preview box will allow you to see how this information will appear in other systems used on campus such as Microsoft Teams and Blackboard.

Research and Citation Help

For help selecting research topics, finding information, citing sources, and more, ask a librarian. The UVM Libraries are eager to help. You may ask questions by phone, e-mail, chat, or text, or make an appointment for an individual consultation with a librarian.

Howe Library: https://library.uvm.edu/askhowe
Dana Medical Library: https://dana.uvm.edu/help/ask
Silver Special Collections Library: https://specialcollections.uvm.edu/help/ask

Course Evaluation:

There will be opportunity to provide formal, anonymous feedback on the course at the end of the semester. From a policy standpoint, it is expected that you complete the survey. Such survey data is taken seriously by the department and is a service to your peers in future sections. I personally value your feedback and will read and consider all of it after the semester. However, I also encourage you to bring any concerns or questions to me during the semester such that I can act to improv your experience and learning.

Tips for Success:

Course-specific study/preparation tips
Here are a few resources for students on remote/online learning:

- Checklist for success in https://learn.uvm.edu/about/support-for-students/checklist-online-credit-courses/
- Academic support for online courses: https://www.uvm.edu/academicsuccess/online-learning-student-resources-remote-instruction
- 30-minute webinar on online learning success (Mar 2020): https://www.youtube.com/watch?v=Xp_MYsqQyvE

Helpful resources other than the professor include Undergraduate/Graduate Writing Center, Supplemental Instruction, Learning Co-op tutors, but I am helpful, too.

Student Learning Accommodations:

In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course. Faculty who receive Letters of Accommodation with Disability Related Flexible accommodations will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.

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

Important UVM Policies

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

Academic Integrity:

The policy addresses plagiarism, fabrication, collusion, and cheating.
https://www.uvm.edu/policies/student/acadintegrity.pdf

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

Grading:

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

Code of Student Conduct:

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

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/

Promoting 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

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

Alcohol and Cannabis Statement:

The Division of Student Affairs has offered the following statement on alcohol and cannabis use **that faculty may choose to include, or modify for inclusion,** in their syllabus or Blackboard site:

Statement on Alcohol and Cannabis in the Academic Environment

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.

General statement regarding potential changes during the semester:

http://catalogue.uvm.edu/

The University of Vermont reserves the right to make changes in the course offerings, mode of delivery, degree requirements, charges, regulations, and procedures contained herein as educational, financial, and health, safety, and welfare considerations require, or as necessary to be compliant with governmental, accreditation, or public health directives.