CHEM 125/126: General Chemistry Laboratory I/II
Section 400: Authentic Research Experience in Snow Chemistry

Lecture: Tuesday 10:00 – 11:00 AM, 1650 Chemistry
Laboratory: Wednesday 2:00 – 5:00 PM
   Section 401/402: A718 Chemistry *See schedule for location exceptions
   Section 403/404: A724 Chemistry *See schedule for location exceptions
Course website: Canvas (https://canvas.umich.edu)

Course Instructors:
Professor Kerri Pratt (prattka@umich.edu)
   Office hours: 3549 Chemistry, Tuesday 1:00 PM – 2:00 PM
Graduate Student Instructors (GSIs):
   Nate May (maynate@umich.edu), Stephen McNamara (smcnam@umich.edu)
   Office hours: 4742 Chemistry, Tuesday & Friday 11:00 AM – 12:00 PM
Postdoctoral Instructor: Dr. Katie Kolesar (kkolesar@umich.edu)
Undergraduate Instructors: Anna Leemon, Alexa Watson, Alicia Kevelin, Claire Mattson

Course Description:
Chemistry 125/126 is a pair of general chemistry laboratory courses condensed into a single semester of calendar time. Section 400 is a special section of Chem 125/126 focused on snow chemistry research with an emphasis on the teamwork, critical thinking, scientific literature, research methods, and presentation skills necessary to conduct scientific research in the real world. As a part of the snow chemistry research experience students will analyze the composition of authentic Arctic snow samples using instrumentation in the Pratt Lab. In addition to the use of state-of-the art research instrumentation, many of the same types of laboratory techniques used and concepts in the standard Chem 125/126 curriculum (e.g., preparation and properties of solutions, spectroscopic measurements, acid/base chemistry) will be employed, but with a snow chemistry application. Snow chemistry is of interest to us as researchers because chemical reactions occurring on snowpack surfaces influence atmospheric composition, which impacts air quality, weather, and climate. Understanding snow composition allows an assessment of these impacts, including the potential for photochemical reactions to impact atmospheric chemistry in the Arctic.

Course Materials:
- Laboratory experiment plans and assignment due dates will be provided via regular updates on the course Canvas website. We recommend that you set-up an automatic alert to an email you regularly check so you do not miss any announcements.
- A bound laboratory notebook, dedicated solely to this course, is required to be used during all laboratory meetings.
- A scientific calculator will be helpful for labs and the exam. Please note that use of programmable or internet-capable devices will not be permitted during exams.
- You may find a copy of Zumdahl & Zumdahl's Chemistry: An Atoms First Approach textbook helpful for reference. If you do not own a copy of this CHEM 130 textbook, it
will be on reserve at the library. Other introductory chemistry textbooks would also be sufficient for use as a reference.

Class Format:
Lectures: These will be held in 1650 Chemistry in a 50-minute format and will focus on background material needed for understanding the laboratory experiments and the field of snow chemistry research.

Laboratory: These meetings will be held in your assigned classroom in a 3-hour format. This is your opportunity to conduct chemical experiments and generate data. Teamwork is required, and a positive outlook is appreciated. Each laboratory class will start with a discussion, led by the GSI, about the laboratory experiment for the day. Unique to section 400 will be that one laboratory meeting will consist of you working with a researcher in the Pratt Research Laboratory to use research instrumentation as part of the course.

Laboratory Safety:
This is a laboratory-based course. Your health and safety are very important to us. We require that you wear proper lab attire, including safety goggles and clothing that covers from shoulder to foot. Tops that have sleeves (even short sleeves) are required, as are footwear that fully enclose the foot. If you arrive to the laboratory without the proper attire, you will not be able to conduct any experiments.

A few words on eye protection: at the beginning of each lab session, there will come a time (following any pre-lab paperwork) when your instructor will request that eye protection be worn. If a student is observed to be in the lab without their goggles in place, that student will receive one (1) verbal reminder to keep their eyes protected. If such a student is observed to be without eye protection a second time in a class session following a verbal reminder, that student is choosing to be removed from the course for the semester.

Attendance Policy:
In a lab course, attendance at both the lecture and lab is required. We expect you to be learning chemistry through a hands-on, practical approach. Your teammates will also be depending on you. In this research-based section, it is important to perform all experiments, data analysis, and literature evaluation activities for assess the results of your project at the end of the semester. If you find yourself in a situation that will require an absence, please email the course instructor, Prof. Pratt, to discuss your individual circumstances. In true matters of life and death, we will be able to find an acceptable academic solution. In the case of more trivial matters, you will not receive credit for lecture attendance or laboratory-related graded work (pre-lab and post-lab activities). If you will miss class due to travel associated with officially representing the University of Michigan, the associated documentation should be presented at the beginning of the term, or at least two weeks prior to the event.
**Academic Integrity:**
Cheating, plagiarism, and data falsification will not be tolerated. The College of LSA promotes the assumption of personal responsibility and integrity, and prohibits all forms of academic dishonesty and misconduct. Students suspected of academic dishonesty will be referred to the Assistant Dean for Undergraduate Education. While your work in the laboratory will be collaborative, we expect that all written work, except the posters, will be only your own. A minimum sanction of a zero score for an offending quiz, post-lab, lab report, or exam will be imposed. For more information, including examples of behaviors that are considered academic misconduct and potential sanctions, please see [www.lsa.umich.edu/academicintegrity](http://www.lsa.umich.edu/academicintegrity); students are encouraged to take the Academic Integrity Quiz on the website to help learn about this material.

**Evaluation:**
Your score for the course will be based on a weighted percentage, as described by the following components:

1) Lab professional evaluation  
2) Lab technique evaluation  
3) Lecture attendance  
4) Pre-lab activities  
5) Notebook record keeping  
6) Written post-lab worksheets and reports  
7) Poster content  
8) Poster oral presentation  
9) Research manuscript  
10) Exam

Letter grades will be assigned based on the total percentage score for the entire semester. Bonus points (worth 1%) will be given for filling out all assessment surveys given during the course (filling out only one survey or only partially filling out a survey will not yield any bonus points).

*Lab professional evaluation* is a more subjective assessment by your GSI to provide feedback on your citizenship. We will be evaluating your conduct for things like working respectfully in a team setting, meeting deadlines, punctuality, and other indicators of professional disposition.

*Lab technique evaluation* is an objective assessment from your GSI to provide feedback on your skill in the laboratory. This will include things like working safely in a conscientious, calm, and orderly manner.

*Lecture attendance* refers to attendance at the 11 Tuesday lectures. Refer to the attendance policy.

*Pre-lab quizzes* will be given out by your GSI at the beginning of each lab. Attendance at the previous day’s lecture will be helpful to prepare for these quizzes, which will assess your preparedness to complete the laboratory experiment of that particular day.
Written post-lab documents are prepared by each student (not shared authorship) in a limited format. Post-lab documents for each lab will take one of two forms: 1) worksheets completed during experiment and turned in at the end of the lab, or 2) short written reports turned at the start of the next lab. The formatting for the short written reports will be described during the specific labs.

Notebook records are also an important skill of a professional scientist. We will expect you to keep an up to date record of your experimental details and data in the course. Your notebook should be dedicated to this class only, with no extraneous content unrelated to your lab work, and must be bound and purpose-dedicated. Experiment notes should be written using a pen, rather than a pencil.

Exam: This is a paper-based exam that will include testing background knowledge covered in lectures, as well as problems related to the lab experiments, particularly data analysis and interpretation, completed in the course.

Poster: A public poster symposium will be held for you to showcase your research results. Posters will be prepared individually and will include seven sections: introduction, methods, results & discussion, conclusions, future suggestions, acknowledgments, and references. Evaluation of poster presentations will consist of two components: content and oral presentation. This will be judged by your course instructors, as well as by graduate students and postdoctoral researchers in the Department of Chemistry. Poster formatting and presentation skills will be described in Lab 10, and poster evaluation forms will be provided at that time. The poster will be the culmination of your semester-long research project, and therefore, you will have the best chance of success if you use the entire semester to work toward the poster and research manuscript (below).

Research manuscript: This will be prepared by each student (not shared authorship) describing your own snow chemistry research results in the context of other literature published in scientific journals. Portions of the research manuscript will be due as post-lab activities throughout the semester, and feedback should be incorporated through revisions to produce a polished final research manuscript.
**Students with Disabilities:**

If you think that you need an accommodation for a disability, please let Prof. Pratt know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress. As soon as you make Prof. Pratt aware of your needs, we can work with the Services for Students with Disabilities (SSD) office to help us determine appropriate academic accommodations. SSD (734-763-3000; [http://ssd.umich.edu](http://ssd.umich.edu)) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. Any information you provide is private and confidential and will be treated as such. If you already have a VISA form from SSD, please present this form to Prof. Pratt at the beginning of the term, or at least two weeks prior to the need for the accommodation, so that there is enough time for the appropriate arrangements to be made.

**Student Sexual Misconduct Policy:**

Title IX prohibits discrimination on the basis of sex, which including sexual misconduct – including harassment, domestic and dating violence, sexual assault, and stalking. We understand that sexual violence can undermine students’ academic success, and we encourage anyone dealing with sexual misconduct to talk to someone about their experience, so they can get the support they need. Confidential support and academic advocacy can be found with the Sexual Assault Prevention and Awareness Center (SAPAC) on their 24-hour crisis line (734-936-3333) and at [http://sapac.umich.edu](http://sapac.umich.edu). Alleged violations can be non-confidentially reported to the Office for Institutional Equity (OIE) at [institutional.equity@umich.edu](mailto:institutional.equity@umich.edu).
### Tentative Laboratory Schedule

*Note that some labs will meet in locations outside the normal laboratory rooms*

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<thead>
<tr>
<th>Week</th>
<th>Topics</th>
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<tbody>
<tr>
<td>Sept. 6-7</td>
<td>Lecture only; <em>No lab meeting this week</em></td>
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<tr>
<td>Sept. 13-14</td>
<td>Lab 1: Drawer check-in, Assessment, Measurements &amp; Uncertainty</td>
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<td>Sept. 20-21</td>
<td>Lab 2: <em>Preparation of Standard Solutions, Part I</em></td>
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<tr>
<td>Sept. 27-28</td>
<td>Lab 3: <em>Preparation of Standard Solutions, Part II</em></td>
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<td>Oct. 4-5</td>
<td>Lab 4* <em>(Shapiro 4041)</em>: <em>Scientific Literature</em></td>
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<td>Oct. 11-12</td>
<td>Lab 5: <em>pH &amp; Buffering</em></td>
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<tr>
<td>Oct. 18-19</td>
<td><em>No lecture this week</em>; Lab 6: <em>Poster Presentation Workshop</em></td>
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<tr>
<td>Oct. 25-26</td>
<td>Lab 7* <em>(Shapiro 4041)</em>: <em>Data Analysis Procedures</em></td>
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<td>Nov. 1-2</td>
<td>Lab 8: <em>Precipitation Reactions</em></td>
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<td>Nov. 8-9</td>
<td>Lab 9: <em>Cl₂ Reactions &amp; Absorbance</em></td>
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<td><strong>Exam: Thursday, Nov. 10, 6:00-7:30 PM, CHEM 1300</strong></td>
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<tr>
<td>Nov. 15-16</td>
<td>Lab 10* <em>(Shapiro 4041)</em>: <em>Creating Research Posters, Part I</em></td>
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<td>Nov. 22-23</td>
<td><em>No lecture or lab meeting this week</em> – Additional office hours during lecture and lab periods for manuscript and poster guidance. <strong>Research Manuscript Due</strong> - Drop off at Chem 3550 by Nov. 23 at 5:00 PM</td>
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<tr>
<td>Nov. 29-30</td>
<td>Lab 11* <em>(Shapiro 4041)</em>: <em>Creating Research Posters, Part II</em></td>
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<tr>
<td>Dec. 6-7</td>
<td>Poster Symposium (*Lower atrium of Chemistry Building): Drawer check-out, <em>Poster Presentations</em></td>
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**VARIOUS**  
Lab 12* *(Pratt Lab, CHEM 3550)*: **Ion Chromatography of Snowmelt**  
*(Assigned based on individual student schedules)*