FUNDAMENTALS OF CHEMICAL MEASUREMENTS
SYLLABUS for FALL 2022
CHEM:2021:OAAA (lecture), CHEM:2021:0A01 (laboratory), CHEM:2021:0A02 (laboratory)

UI Indigenous Land Acknowledgement (Link to video)

The University of Iowa is located on the homelands of the Ojibwe/Anishinaabe (Chippewa), Báxoje (Iowa), Kiikaapoi (Kickapoo), Omāeqlommenēwak (Menominee), Myaamiaki (Miami), Nutachi (Missouri), Umo"ho" (Omaha), Wahzhazhe (Osage), Jiwire (Otoe), Odawaa (Ottawa), Pó"ka (Ponca), Bodéwadmi/Neshnabē (Potawatomi), Meskwaki/Nemahakah/Sakiwaki (Sac and Fox), Dakota/Lakota/Nakoda, Sahnish/Nuxbaaga/Nuweta (Three Affiliated Tribes) and Ho-Chunk (Winnebago) Nations. The following tribal nations, Umo"ho" (Omaha Tribe of Nebraska and Iowa), Pó"ka (Ponca Tribe of Nebraska), Meskwaki (Sac and Fox of the Mississippi in Iowa), and Ho-Chunk (Winnebago Tribe of Nebraska) Nations continue to thrive in the State of Iowa and we continue to acknowledge them. As an academic institution, it is our responsibility to acknowledge the sovereignty and the traditional territories of these tribal nations, and the treaties that were used to remove these tribal nations, and the histories of dispossession that have allowed for the growth of this institution since 1847. Consistent with the University’s commitment to Diversity, Equity and Inclusion, understanding the historical and current experiences of Native peoples will help inform the work we do; collectively as a university to engage in building relationships through academic scholarship, collaborative partnerships, community service, enrollment and retention efforts acknowledging our past, our present and future Native Nations. (Link to Learn More About the Land Acknowledgement and our Native Nations)

I. Instructional Team

<table>
<thead>
<tr>
<th>Faculty Instructor</th>
<th>Professor Stone (she/her; <a href="mailto:betsy-stone@uiowa.edu">betsy-stone@uiowa.edu</a>)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Professor, Department of Chemistry</td>
</tr>
<tr>
<td></td>
<td>Chemistry Building, W313 CB, (319) 384-1863</td>
</tr>
<tr>
<td></td>
<td>Office hours: Mondays 9:30-10:30am (Zoom), Wednesdays 10:30-11:30am (Zoom), and by appointment.</td>
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<table>
<thead>
<tr>
<th>Teaching Assistants (TAs)</th>
<th>Abby Carlin (<a href="mailto:abigail-carlin@uiowa.edu">abigail-carlin@uiowa.edu</a>)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Office hours: Wednesday 8:30-9:30am (E208 CB) and Thursdays 5:30-6:30pm (E208 CB)</td>
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<thead>
<tr>
<th></th>
<th>Hannah Crull (<a href="mailto:hannah-crull@uiowa.edu">hannah-crull@uiowa.edu</a>)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Office hours: Monday 1:30-2:30pm (hybrid in E208 CB and Zoom) and Wednesday 2:30 – 3:30 PM (E208 CB)</td>
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<tr>
<th></th>
<th>Janeshta Fernando (<a href="mailto:madinagejaneshta-fernando@uiowa.edu">madinagejaneshta-fernando@uiowa.edu</a>)</th>
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<tr>
<td></td>
<td>Office hours: Tuesday and Wednesday 7:30-8:30pm (E208 CB)</td>
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<tr>
<th></th>
<th>Hong Bok Lee (<a href="mailto:hongbok-lee@uiowa.edu">hongbok-lee@uiowa.edu</a>)</th>
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<tr>
<td></td>
<td>Office hours: Monday 7:30-8:30pm (E208 CB) and Wednesday 12:30-1:30pm (E208 CB)</td>
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## II. Course Matters

<table>
<thead>
<tr>
<th><strong>Lecture</strong></th>
<th>Chemistry Building W228 CB</th>
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<tbody>
<tr>
<td><strong>Location/Time</strong></td>
<td>Tuesdays and Thursdays 9:30 – 9:20am</td>
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<table>
<thead>
<tr>
<th><strong>Laboratory</strong></th>
<th>Chemistry Building E440</th>
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<tbody>
<tr>
<td><strong>Location/Time</strong></td>
<td>Tuesdays and Thursdays</td>
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<tr>
<td>Morning Lab: CHEM:2021:0A01; 9:30am-12:20pm</td>
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<tr>
<td>Afternoon Lab: CHEM:2021:0A02; 2:00pm-4:50pm</td>
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**Course Objective**

The goal of this course is for students to learn how to make fundamental analytical measurements in the laboratory. The course will emphasize measurement theory, practical skills, and laboratory safety. Course objectives include volumetric analysis, spectrophotometry, chromatographic separations, mass spectrometry, standardization, calibration, error analysis, hypothesis testing, modeling, graphical representation, and discussion of results.

**Course Structure**

The course is divided into lecture and laboratory sections. Lectures will cover the basic principles of the experiments, statistics, and data analysis. Ten laboratory experiments will provide a practical setting to safely conduct experiments and analyze data. One experiment will involve on-campus field work. Initially, the course material will focus on general procedures for analyzing and presenting data along with learning laboratory skills. The course structure and schedule may be adapted at the discretion of the lead instructor as needed.

**Textbook**

*Quantitative Chemical Analysis*, 10th edition (2020); Daniel C. Harris, Charles A. Lucy, W. H. Freeman & Co. (Note: The 7-9th editions may alternatively be used, but students must refer to the 10th edition for the correct sections.)

**Course website**

[http://icon.uiowa.edu](http://icon.uiowa.edu)

**Policy on Class Attendance**

Students are required to attend all lectures and laboratory sessions and to be on time. Students must attend lecture prior to entering the laboratory. Arriving late to laboratory sessions is not permitted. At the discretion of the instructor, lectures will be broadcast over Zoom and/or recorded and posted on the course website.

In the case of an excusable absence (e.g. illness, mandatory religious obligation, certain University activities, or unavoidable circumstances), a completed [Explanatory Statement of Absence](http://icon.uiowa.edu)
form must be provided to the instructor in advance of foreseeable absences or within 72 hours of unforeseeable absences. Missed laboratory sessions can be made up only if the absence is excused.

**Zoom link for access to lectures**

*Zoom link for CHEM:2021 Lectures*

Meeting ID: 927 2675 4443  
Passcode: chemistry  
+13126266799,,92726754443# US (Chicago)

### III. Grading

**Letter Grades**

- **A range**: 90-100%
- **B range**: 80-90%
- **C range**: 70-80%
- **D range**: 60-70%
- **F range**: < 60%

The lower limits for letter grades may be adjusted, but will never be raised. For example, the A range for final grades may be 88-100%, but will not be 95-100%. Plus or minus grades will be appended to letter grades. The grade of A+ is reserved for rare and extraordinary academic achievements.

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Grade Item</th>
<th>Points</th>
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<tbody>
<tr>
<td>1</td>
<td>Safety training</td>
<td>25</td>
</tr>
<tr>
<td>9</td>
<td>Safety quizzes (5 points each experiment, beginning with experiment #2)</td>
<td>45</td>
</tr>
<tr>
<td>10</td>
<td>Notebook preparation, hazard assessment; 10 points each experiment</td>
<td>100</td>
</tr>
<tr>
<td>10</td>
<td>Laboratory performance (safety, preparedness, chemical and waste handling, data recording and sharing as assigned, cleanup, etc.); 15 points each experiment</td>
<td>150</td>
</tr>
<tr>
<td>5</td>
<td>Lab practicum (25-50 points each)</td>
<td>250</td>
</tr>
<tr>
<td>4</td>
<td>Lab reports (Exp. 1-4, 35 points each)</td>
<td>140</td>
</tr>
<tr>
<td>6</td>
<td>Lab reports (Exp. 5-10, 50 points each, lowest score dropped)</td>
<td>250</td>
</tr>
<tr>
<td>1</td>
<td>Spreadsheet assignment</td>
<td>40</td>
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<tr>
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<td><strong>Total</strong></td>
<td><strong>1000</strong></td>
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**Late Assignments**

Assignments are due at the specified date and time. If no time is indicated, assignments must be submitted on ICON by 11:59 PM on the specified due date. Late assignments will be penalized 5 points per calendar day after this deadline.  

*Late report token*: Students may turn in one lab report up to 5 days late one time with no penalty. When submitting one late report, add a comment indicating use of the late report token.
Dropbox Submissions
Assignments are to be turned in to the corresponding ICON Dropbox. It is the student’s responsibility to verify that the correct and complete file is uploaded by the due date.

Re-grading
Adjustments to grades will only be considered within one week after an assignment grade has posted. The re-grade request must be made to Prof. Stone by email and accompanied by a written, detailed description of the grading concern using Regrade Request Form on ICON. Re-grading will involve re-assessment of the entire assignment and may increase or decrease the grade.

Laboratory Notebooks
Each student must maintain a laboratory notebook. Specific instructions for keeping notebooks will be discussed in class and are provided on ICON. Points in the class grade are allocated for the completion of the notebook entries.

Laboratory Performance
Grading criteria for laboratory performance include safety, preparedness, chemical and waste handling, efficiency, cleanup, respectful conduct, use and disposal of personal protective equipment, effective teamwork, collaboration, etc. Assessment will be conducted through observations and oral examinations.

Lab Reports
A lab report must be completed and turned in for each experiment. Required report contents are detailed at the end of each experiment information package. Reports must be prepared using the Microsoft Excel templates provided. All reports must be submitted via the ICON Dropbox as Excel files. It is the student’s responsibility to ensure that completed assignments are successfully submitted on time; this may be done with an email confirmation.

Lab reports for make-up laboratories will be due either one week from the date the lab was made-up or Thursday, December 8, whichever is earlier.

Lab Practicum
Student development of laboratory skills and concepts will be assessed through in-person laboratory practical assessments. Students will demonstrate their ability and effectiveness in using laboratory tools and instruments (e.g., burets, pipets, pH meters, spectrophotometers, etc.) to make accurate and precise analytical measurements.

IV. Course Conduct
Overview
All course participants are expected to conduct themselves in manners that uphold the values of health, safety, honesty, respect, and scientific rigor.
Classroom and Laboratory Etiquette

This course brings together people with various backgrounds, training, and experiences. To facilitate productive classroom experiences and to learn from this wide array of perspectives it is essential to treat each other with respect and to value each other’s opinions. There will be times when people disagree, but debate should be kept to the facts and the merits of the topic and not personal or mean spirited.

Laboratory Safety

Laboratory safety is a primary concern and you will be expected to act in a safe and professional manner. Students are required to follow Department of Chemistry Safety Rules and Guidelines and all instructions from the course instructional team. Failure to meet safety expectations may result in your dismissal from the laboratory session. Repeated or egregious violations of safety expectations will result in dismissal from the course.

1. Come to lab prepared! Before coming to lab, attend lecture, carefully read and understand all laboratory procedures, conduct a thorough hazard assessment, and prepare your laboratory notebook according to the guidelines. Arrive to lab on time to receive all TA instructions.

2. Students must behave in a professional manner that does not put themselves, classmates, staff, or the instructional team at unnecessary risk.

3. Safety goggles must be worn at all times. Masks should be worn to reduce viral spread. Additional personal protective equipment (PPE) may be required for certain experiments. Lab coats are optional.

4. Proper laboratory attire is required to protect you from chemical and physical hazards in the laboratory. Skin must be completely covered from shoulders to toes. Clothing must not have holes.
   - Feet must be completely enclosed in the shoe; socks shall not show. Wear shoes that you will be comfortable standing in for several hours.
   - Legs must be completely covered with either long pants or a long skirt. Leggings are discouraged, as they provide little to no protection against chemical spills.
   - Shoulders and torsos must be completely covered. Ensure that midriffs and backs are completely covered when standing and performing experiments.

5. Report any injury, chemical spill, broken equipment, or other incident to your TA immediately – even if you think it is minor.

6. Enter the laboratory only during your assigned laboratory period and with proper supervision. Do not enter the lab if your TA is not present.

7. Eating, drinking, and smoking are prohibited in the laboratory.
8. Proper disposal of solvents, solids, and sharps is essential for the safety of all. If you are not sure how to dispose of something, ask your TA.

9. Laboratory partners may be (re)assigned at the instructor’s discretion.

10. Instructions from the course instructor, laboratory staff, and TAs must be followed at all times.

**Equipment Policy**
All glassware and other equipment received at the beginning of the semester and assigned your equipment drawer is the responsibility of that student. On the day of check-in, the student must be certain that all the equipment required for the course is in the drawer, the glassware has no chips or cracks, and that the equipment is in good working order. The Chemistry Department will replace any glassware or equipment that is defective at the time of check-in. At the end of the semester or at the time the student leaves the course, every piece of glassware and equipment must be returned to the Department without chips or cracks and in good working order. All pieces of glassware or equipment that are missing, broken, or not in good working order may be charged to the student through the University billing system.

**Technology**
Each student will have access to computers in the departmental computer facility, which is located in W241 CB.

The use of cell phones and the internet during class times is prohibited. All personal devices must be silenced prior to the start of class and stowed in backpacks during laboratory.

**Policy on Academic Honesty**
All graded work must be your own.

Some laboratory experiments will be performed in groups of two. In this case, data will be collected collaboratively and the collected data will be shared among group members. Beyond the data collected, each student should prepare their own lab report, including all calculations, graphs, and discussion.

Students are permitted and encouraged to discuss general procedures for data analysis, use of Excel, and general questions about the procedures and specific data collected. However, this should be done in the context of completing your own work. Here are some examples:

**Example 1:** Student A asks student B: “Can you describe how to change the size of the symbols on my plot?” This type of collaboration is allowed and encouraged.
Example 2: Student A asks student B: “Can I get a copy of your spreadsheet so that I can check my answers?” This type of collaboration is not allowed.

Example 3: Student A asks student B: “What formula did you use to answer Question 2 on the lab report?” This type of collaboration is not allowed. This type of question should be discussed with the teaching assistant or the instructor.

In grading the assignments and lab reports, the instructors will be looking for evidence of improper collaboration. If such evidence is found, all parties involved will receive no credit for the assignment and will be reported to the College of Liberal Arts and Sciences.

Any questions regarding what constitutes honest behavior in this source should be directed to the instructor.

V. Departmental Information

Chemistry Center
The Chemistry Center (for issues related to course registration)
Chemistry Building E225
(319) 335-1341

Departmental Executive Officer (DEO)
Leonard MacGillivray
Chemistry Building E331
(319) 335-1350