CHEM 294: Introduction to Chemical Research
CHEM 694: Chemical Mentoring

The plan:
1. Course structure
2. 294 Syllabus & expectations
3. Course website
4. Introductions
5. Skills and interest assessment
6. 694 Syllabus & Expectations

I’m Dr. Hayes
Research: Geochemistry of toxic metalloid(s)

Geochemistry of Mineral weathering
Mobility and transport
Bioaccessibility
Human and ecosystem exposure and Health
Impact of Undergraduate Research and Mentoring

Undergraduate involvement in research:
- Increases critical thinking
- Intellectual independence
- Student STEM retention
- Improved readiness for graduate school and workforce

Mentoring has been linked to:
- Enhanced self efficacy
- Increased persistence
- Desire to pursue graduate studies

Objective: Develop a translatable, sustainable, tiered-mentoring model for integrating student research across the undergraduate curriculum.


Voluntary inclusion in Study

Undergraduate Research Survey

Your username (smhayes3@alaska.edu) will be recorded when you submit this form. Not smhayes3? Sign out
* Required

Name *

Why are you taking this course?

Which aspects of designing and executing a research project do you feel most comfortable?
- [ ] literature review
- [ ] literature searching
- [ ] formulating testable hypotheses

Do this today!!
Goals of Introduction to Chemical Research

- Facilitate early-career student entry into independent research to improve CHEM 488 student readiness, productivity, and outcomes
- Provide formal training in research ethics, the scientific method, and experimental design

Structure of Introduction to Chemical Research

Lab/Lecture: Mondays 2:15-6:15 pm
Preliminary results from 2015 cohort

100% of students would recommend this course to their peers

100% agree “I feel more prepared for CHEM 488 than before”

63% of students submitted proposals (100% funded)

50% of mentoring relationships have persisted

“I actually felt like I was part of a team effort. I felt like I was contributing to the field as a whole, in a tiny way.”

“This class is an introduction to a whole new world... Having our own project seemed liberating and encouraged me to learn and succeed.”

Course Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Week</th>
<th>Task(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 25</td>
<td>1</td>
<td>Introduction and course details</td>
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<tr>
<td></td>
<td></td>
<td>Lecture (M 2:15-3:15)</td>
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<td></td>
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<td>Lab (M 3:15-6:15)</td>
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<td>Feb 1</td>
<td>2</td>
<td>Introduction to the research process</td>
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<td></td>
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<td>694: Lab rotations plan</td>
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<td>Feb 8</td>
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<td>Project funding</td>
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<td>694: Mentoring training</td>
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<td>Feb 15</td>
<td>4</td>
<td>Ethics &amp; Keeping records</td>
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<td></td>
<td></td>
<td>294: ID funding target &amp; template</td>
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<tr>
<td></td>
<td></td>
<td>694: Bring notebooks as example</td>
</tr>
<tr>
<td>Feb 22</td>
<td>5</td>
<td>Surveying primary literature</td>
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<tr>
<td></td>
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<td>294: Review article summary</td>
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<td>294: Lab rotation feedback</td>
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<td>Feb 29</td>
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<td>Stating a testable hypothesis</td>
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<td>294: Annotated Bibliography (3 articles)</td>
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<td>Mar 7</td>
<td>7</td>
<td>Experimental design</td>
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<td>294: updated Annotated Bibliography</td>
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<td>294: Literature Review</td>
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<td>Mar 14-18</td>
<td>8-12</td>
<td>Spring Break</td>
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<td>Mar 21</td>
<td>8</td>
<td>Writing procedures</td>
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<td>694: Bring a procedure example</td>
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<td>Mar 28</td>
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<td>Other proposal components</td>
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<td>294: Research Project Plans</td>
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<td>294: Notes on funded proposal</td>
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<tr>
<td>Apr 4</td>
<td>10</td>
<td>What is science?</td>
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<td>Apr 11</td>
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<td>Statistical analysis of data</td>
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<td>Apr 18</td>
<td>12</td>
<td>Ethics of scientific research</td>
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<td>Peer review and proposal revision</td>
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<td>294: Discussion with instructor</td>
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<td>294: Research Project Plan feedback</td>
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<td>694: Literature feedback</td>
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<td>694: Lab rotations self reflection</td>
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<td>694: Lit review feedback</td>
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<td>694: Brainstorming notes (after lab)</td>
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</tbody>
</table>
Introduction to Chemistry Research

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SCHEDULE

Week 1 (Jan 25): Introduction
Due: CHEM 294 Undergraduate Experience Poll (complete during class)
Lab: CHEM 294/694 students present Research Introductions (Runcorn room)

** Text book is available as a pdf online. Click "download free PDF" in the blue box on the right.**

Week 2 (Feb 1): Introduction to the Research Process
Required reading: On Being A Scientist, Ch 1-2, pgs. 1-7
Due: CHEM 694 Lab rotation plans- this is a plan for what you will do with students in weeks 3 and 4.
Lab: CHEM 294- Lab safety training in Spencer Library (Reichardt 138)
CHEM 694- Mentoring Training in Runcorn Room (Reichardt 300)

https://chemresearch.community.uaf.edu

Course Evaluation

<table>
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<th>Assignment</th>
<th>Points</th>
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<tbody>
<tr>
<td>Lab rotation summaries</td>
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<tr>
<td>Proposal format, proposal topic</td>
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<td>Annotated Bibliography</td>
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<td>Literature Review</td>
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<td>Project Plan and revisions</td>
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<td>Research proposal</td>
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<td>Final presentation</td>
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<td>Final research proposal</td>
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<td>Mentor and instructor evaluations</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>500</strong></td>
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See website for details on assignment requirements
**Introductions**

**CHEM 294 - 5 minutes**
- Name
- Area of interest
- Year in school
- Reason for taking the course
- Interesting tidbit

**CHEM 694 - 10 minutes**
- Name
- Advisor, research area
- Year in graduate school
- 5 minutes on your research topic
- Undergraduate project ideas
- Interesting tidbit

**Looking ahead**

**Today**
- Undergraduate Experience Poll (due today after class)
- CHEM 694 Course Introduction

**Monday (Feb 1)**
- Introduction to the Research Process
- CHEM 694 Lab rotation plans due
- Lab
- CHEM 294: Safety training with Emily Reiter
- CHEM 694: Mentoring Orientation
CHEM 694: Chemical Mentoring

Dr. Sarah Hayes
Asst. Professor

The plan:
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CHEM 694 Course Goals

• Systemize, refine, and articulate their approach to research planning
• Provide formal training for students in mentoring
  • Articulate a mentoring philosophy
  • Develop strategies for recognizing and resolving challenging situations positively
  • Identify tools that facilitate clear communication and foster strong relationships
• Nucleate mentoring relationships and facilitate a mentoring experience
Course Evaluation

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Points</th>
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</thead>
<tbody>
<tr>
<td>Participating in mentoring discussion group</td>
<td>100</td>
</tr>
<tr>
<td>Lab rotation plan, execution, and reflection</td>
<td>100</td>
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<tr>
<td>Feedback on mentee assignments</td>
<td>50</td>
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<tr>
<td>Lecture</td>
<td>200</td>
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<tr>
<td>Mentoring evaluation</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>500</strong></td>
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Lab Rotation Plan *(Due Feb. 1)*

Performed Weeks 3-4

Mentoring Discussion Group

Formal mentoring training

• Starts Week of Feb 1
• Based on “Entering Mentoring” curriculum

When?

Sarah Hayes & Lori Gildehaus
Lab Rotation Plan (Due in class Feb 2)

- 1 pg. summary of what you plan to do with undergraduate students during lab rotations.

This should include:
What engaging activity will you do with the undergrad students?
- Instrument use encouraged
- Safety hazards, concerns, and how they will be mitigated?

Post-activity feedback provided by undergrads
Self evaluation (Due Feb 22)

Lecture

1. Written lesson plan

Meet with the instructor

1. Instructional Materials

Meet with the instructor

3. Deliver lecture to CHEM 294 class

4. Lecture self reflection

Meet with the instructor