

CHEM 475: Chemistry Research Seminar**Goals for this course:**

- ◆ to build upon previous knowledge of chemical information literacy
- ◆ to develop chemical information literacy skills that are essential in scientific research. “connecting to the larger chemistry community”
- ◆ to develop information literacy skills that translate to other areas of inquiry and scholarship
 - ◆ to be able to perform comprehensive literature searches using the library and online databases and refine search strategies to find relevant information
 - ◆ to be more efficient in finding desired chemical information in the literature
 - ◆ to be able to organize chemical information on a research topic
 - ◆ to be able to distinguish especially significant publications
 - ◆ to be able to critically read primary research articles
 - ◆ to sharpen writing skills
 - ◆ to sharpen oral presentation skills
 - ◆ to recognize the process of publishing chemistry research results
 - ◆ to better understand how chemistry research occurs in academics, industry and government labs
 - ◆ to explore how ethical dilemmas affect research and communication of results

ACRL Standards

[See <http://www.ala.org/acrl/ilstandardlo.html>]

Session 1: organizational meeting

- ◆ Students provide feedback (using self-assessment questions) about their knowledge of specific chemical information resources.

Standard 2: The information literate student accesses needed information effectively and efficiently.

- ◆ Students select topic of interest for this course (and senior exercise).

Standard 1, Performance Indicator 1: The information literate student defines and articulates the need for information.

- ◆ Discuss short progress reports

Standard 4, Performance indicator 2: The information literate student revises the development process for the product or performance.

Outcomes Include:

1. Maintains a journal or log of activities related to the information seeking, evaluating, and communicating process.
2. Reflects on past successes, failures, and alternative strategies.

Session 2: introduction to the chemistry literature

Objectives: Students understand the difference between primary, secondary and tertiary sources; and between popular and scholarly literature.

Tertiary sources (review): provide background on a topic/scientist. Useful for answering factual questions i.e. melting point.

- ◆ textbooks
- ◆ reference books

Secondary sources: provide summaries, or critical reviews of research. Students will write their own critical annotations for session 7.

- ◆ review articles
- ◆ monographs

Primary sources

- ◆ Journal hierarchy (influence and reputation)
- ◆ *Science* and *Nature*
- ◆ ACS journals
- ◆ European journals

Peer-review process

- ◆ Editorial boards: Students will review a classmate's annotated bibliography in session 7.
- ◆ Submitted/accepted dates
- ◆ Examples of skipping the peer-review process (cold fusion fiasco)
- ◆ Recent trend/issues re: online preprints banned by ACS journals

Session 3: basic online searching of chemistry literature

- ◆ Science Citation Index
- ◆ ACS journal search
- ◆ EJC search

Give assignment of primary literature search on individual research topics: Students will list relevant topic, keywords, controlled vocabulary, registry numbers, authors.

Standard 2. Performance indicator 2: The information literate student constructs and implements effectively-designed search strategies.

Standard 2: The information literate student accesses needed information effectively and efficiently.

During the course of the semester, we'll promote this by conducting sessions on EJC, Web of Science and STN. Hopefully, their in-class discussion and journal entries will reveal how "efficient" their searches are becoming.

Session 4: advanced online searching of chemistry literature

- ◆ Chemical Abstracts using STN
- ◆ Assignment: do a comprehensive search on their topic.

Standard 2: The information literate student accesses needed information effectively and efficiently.

Standard 2, Performance Indicator 1: The information literate student selects the most appropriate investigative methods or information retrieval systems for accessing the needed information.

Standard 2, Performance indicator 2: The information literate student constructs and implements effectively-designed search strategies.

During the course of the semester, we'll promote this by conducting sessions on EJC, Web of Science and STN. Hopefully, their in-class discussion and journal entries will reveal how "efficient" their searches are becoming.

Session 5: student presentations of literature searches

- ◆ Informal 10 minute presentation of what papers were found, how search was refined to obtain a set of ~10 primary papers and some general references relevant to individual research topic
- ◆ Discuss literature lineage
- ◆ Discuss citations received
- ◆ Discuss the major players in the field

Standard 2, Performance Indicator 4: The information literate student refines the search strategy if necessary.

Standard 3, Performance indicator 1: The information literate student summarizes the main ideas to be extracted from the information gathered.

Session 6: writing a literature review

- ◆ Review of basic scientific writing (Department packet)
- ◆ Paper organization
- ◆ Narrowing a topic
- ◆ Reviewing and critiquing and comparing/contrasting primary articles
- ◆ Designing an appropriate Introduction
- ◆ Writing an effective abstract
- ◆ Using proper citations

- ◆ Students will prepare an annotated outline/bibliography

Standard 4: The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.

As part of the annotated bibliography, we could require the students to write one sentence about the source (journal/author/research group) of each article.

Standard 3: The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledge base and value system.

Standard 5, Performance indicator 3: The information literate student acknowledges the use of information sources in communicating the product or performance.

Session 7: critiquing an annotated outline/bibliography

- ◆ Critically reading a literature article
- ◆ Discussion of student writing
- ◆ Teams of 2 evaluate each other's bibliographic outlines

Standard 4: The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.

Standard 3, Performance Indicator 6: The information literate student validates understanding and interpretation of the information through discourse with other individuals, subject-area experts, and/or practitioners.

In the students' outlines, confirm that they are stringing their ideas together in an interesting way (not just listing ideas and articles).

Session 8: Oral presentation skills/PowerPoint workshop

- ◆ PowerPoint workshop: Students will bring their outline (developed in Session 7)
- ◆ Organizing a talk (similar to review paper)
- ◆ Introductions and conclusions
- ◆ Pace
- ◆ Public speaking techniques
- ◆ Use of (other) visual aids
- ◆ Overhead projectors
- ◆ Laser pointers

Standard 4, Performance indicator 3: The information literate student communicates the product or performance effectively to others.

Session 9: discussion of chemistry research in industry, academia and national labs

- ◆ Panel discussion of graduate school
- ◆ Other career options

Session 10: discussion of trends in chemistry research

- ◆ Areas, funding, and methods

Session 11: discussion of conduct in scientific research

- ◆ “25 years of sense and nonsense in Chemistry”
- ◆ credit/ownership of results
- ◆ conflicts of interest

Standard 5: The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally.

Standard 5, Performance indicator 1: The information literate student understands many of the ethical, legal and socio-economic issues surrounding information and information technology.

Session 12 student presentations of research papers

- ◆ 15 minute oral presentations describing the research topic (overview)

Standard 4, Performance indicator 1: The information literate student applies new and prior information to the planning and creation of a particular product or performance.

Session 13 student presentations of research papers

- ◆ 15 minute oral presentations describing the research topic (overview)

Standard 4, Performance indicator 1: The information literate student applies new and prior information to the planning and creation of a particular product or performance.

Session 14 student presentations of research papers

- ◆ 15 minute oral presentations describing the research topic (overview)

Standard 4, Performance indicator 1: The information literate student applies new and prior information to the planning and creation of a particular product or performance.

- ◆ Students turn in progress reports.

Standard 1: The information literate student determines the nature and extent of the information needed.

Standard 1, Performance indicator 4: The information literate student reevaluates the nature and extent of the information need.

We could assess this by reading the entries in their progress reports (i.e. "I've decided to follow-up on this sub-field of my topic, but now I have to redo some searches, to identify the prominent authors.")