

CHE 588 – Scientific Writing and Research Methods

Catalogue Description

Training in library research skills and interpretation of the chemical literature for the preparation of scientific documents and presentations. Hands-on computer training using current online resources and recent discipline-specific computer programs.

Text

Coghill, A. M. , Garson, L. R., Eds *The American Chemical Society Style Guide, 3rd Edition*; Oxford University Press: New York, 2006. (ISBN: 0-8412-3999-1)

Course Description

- A. **Course Objectives:** Upon completion of this course a student will be able to:
1. Search the scientific literature using online and bound hardcopy resources.
Assessment: assignments, presentation, and final report
 2. Evaluate/interpret selected literature publications for chemistry content.
Assessment: class discussions, presentations and final report
 3. Evaluate/interpret selected literature publications for preferences involving writing/drawing styles.
Assessment: assignments, discussions, presentation, and final report
 4. Prepare documentation using style sheets according to the ACS Style Guide and the SCSU Graduate Thesis Regulations using Microsoft Word® software.
Assessment: assignments, report drafts, and final report
 5. Prepare chemical drawings using style sheets according to the ACS guidelines and guidelines for other national publications using ChemDraw® software.
Assessment: assignments, presentation, and final report
 6. Prepare scientific reports that adhere to the guidelines cited above including specific styles for the citation of literature sources, proper formats for summarizing and reporting physical and spectroscopic data from chemical analysis, and proper use of style sheets in related advanced drawing software packages.
Assessment: assignments, presentation, and final report
 7. Utilize Microsoft Excel® to prepare tabular and graphical data for presentation and analysis.
Assessment: assignments, and presentation/final report where applicable
 8. Utilize additional tools available in Microsoft Word® such as Tables, Track Changes to effectively address document revision.
Assessment: assignments
 9. Prepare presentations using Powerpoint®/ChemDraw® software according to the suggested guidelines of the ACS.

- Assessment:** presentation quality and content
10. Utilize ChemDraw® software to perform calculations of ^1H and ^{13}C NMR spectra for molecules.
Assessment: assignments
11. Utilize Chem3D® software to perform semi-empirical calculations of molecules to interpret energy surface diagrams and predict energy values for molecular orbitals.
Assessment: assignments

B. ***Course Outline:***

Week 1: Introduction to the course. Routines for the use of computers in the Chemistry computing facility including ensuring passwords are current for computer use. Discussion of the thesis guidelines and general overview of other applicable styles, and issues related to plagiarism. Use of basic of tools in the Microsoft Office® software package.

Weeks 2, 3: Using Microsoft Office continued. Demonstrations of setting styles according to the thesis guidelines and ACS styles. Use of the Track Changes program, equation editor (Microsoft equation®) program, Excel® software and setting page attributes. Assignment of research topics.

Week 4: Using the resources at Buley Library. Librarian Rebecca Hedreen will demonstrate the options available using our library resources along with online searching tools. Further demonstrations of searching hard-bound abstracts will be discussed. Each student will utilize the STNEasy® software to search their research topic and begin the acquisition of articles. (accessible after 5 PM to students and faculty).

Weeks 5, 6: Interpretation of research articles. Description of the different publication formats and where we locate the specific requirements for publishing. How to extract/interpret the important information in a publication. Analysis of publication styles including general considerations when publishing a research paper, writing a proper experimental procedure, review of spectral analysis, ACS styles for reporting spectroscopic data.

Weeks 6, 7: Discussion of research topics. Brief presentations of the research topic and articles selected for the research proposal by each student.

Weeks 7,8,9: Using ChemOffice® software including ChemDraw® and the tools incorporated in the program, Chem3D® and semi-empirical calculations. Considerable hands-on experience and demonstrations of the drawing tools at an introductory and advanced level. Using ChemDraw® across platforms.

Weeks 10, 11: Using Powerpoint® software. Description of ACS styles for poster and oral presentations. Working across platforms with Powerpoint® including incorporation of drawings, pictures, and tables. Making a meaningful presentation.

Weeks 12, 13, 14
Presentation of research proposals.

C. *Modes of Instruction:*

The modes of instruction will include listening to lectures, demonstrations of software, hands-on experience by students using software, listening to presentations, and evaluating presentations.

Demonstrations and hands-on use of software will include: Microsoft Word®, Microsoft Excel®, ChemDraw®, Chem3D®, STNEasy® (literature searching), and PowerPoint®.

D. *Evaluation:*

Student evaluation will involve the grading of approximately 4 assignments with specific details that address proficiency using style sheets, drawing programs, presentation tools, etc. as outlined in the specific objectives noted above. Students will also prepare a short literature review followed by a research proposal on the same topic. The review and proposal will be presented to and evaluated by the class and the instructor. The written report will be evaluated by the instructor for consistency with accepted ACS styles and additional styles found in the SCSU Thesis Guidelines as well as for other software used for drawing chemical structures, figures, schemes, mechanisms and so forth.

The assignments will be designed to guide each student through the various steps in the design of a research topic and are meant to be progressive in nature. This will begin with a literature search of an assigned research topic and evaluation of 5 recent journal articles (at least one from an ACS journal). The students will evaluate the papers to ascertain the main advances related to the topic and give a short interim presentation. Based on the results of the evaluation of the literature and feedback from the initial presentation, the student will be required to prepare a proposal for future work (research proposal) including the use of style sheets, ChemDraw®, calculations and predicting software within the ChemDraw® program, and any other appropriate guidelines that are specifically expressed in the assignment.

The use of the computing resources for manuscript preparation will be taught concurrently (through demonstrations and hands-on practice) and assignments will require specific style sheet preparation that will be submitted ensuring student progress throughout the course.

Assignment content will include:

1. Searching an assigned topic using STNEasy® and other online resources available at Buley library and the the bound Chemical Abstracts by title, author, chemical formula. Students will summarize the results according to accepted citation styles. The analysis of the chemistry content and identification of the key advances will be evaluated.
2. Setting up assignments using prescribed style parameters in Microsoft Word® and ChemDraw® including formatting of written material such as a Tables of Content, formatting of special characters (including Equation Editor® or an equivalent program), use of the Track Changes tool with electronic submission of assignments, and the preparation of figures, equations, schemes and mechanisms.
3. Using the tools in ChemOffice® to predict physical data, NMR spectra, and prepare molecular modeling studies including styles for reporting spectroscopic data.

The proposal and presentation will include:

The research proposal will incorporate all introductory pages according to the Thesis Guidelines established by the School of Graduate Studies and the appropriate formatting styles. The instructor will evaluate the content of the written documents. Each student will evaluate the presentations along with the instructor. An evaluation form (see below) has been designed in concert with Bloom's Taxonomy (where applicable) for this purpose. Each presentation will be followed by a brief question and answer period during which students are expected to participate with comments/questions pertaining to styles, drawings, content, etc.

Each presentation will be evaluated for:

- (i) clarity in the presentation of the research topic
- (ii) formatting of documents using the appropriate style sheets
- (iii) use of software programs and the tools within these programs in the presentation
- (iv) appropriate proposal content
- (v) overall quality of the presentation

The final grade will be assessed based on the following rubric.

Assignments	30%
Proposal (written)	50%
Proposal presentation	20% (10% based on student evaluations)

E. ***Bibliography:***

1. Ebel, H. F.; Bliefert, C.; Russey, W. E. *The Art of Scientific Writing*, 2nd Ed.; Wiley: New Jersey, 2003. ISBN 3-527-29829-0
2. Fieser, L.; Fieser, M. *Style Guide for Chemists*; Kreiger: Huntington, NY, 1972.
3. Schoenfeld, R. *The Chemist's English*, 3rd Ed.; VCH Publishers: Deerfield Beach, FL, 1989.
4. Perelman, L. C.; Barrett, E.; Paradis, J. *The Mayfield Handbook of Technical and Scientific Writing*, 1st Ed.; McGraw Hill: NY, 1997. ISBN 1559346477
5. Halliday, M. A. K. *Writing Science: Literacy and Discursive Power*; University of Pittsburgh Press: Pittsburgh, 1993.
6. Roze, M. *Technical Communication: The Practical Craft*, 3rd Ed.; Prentice Hall: Upper Saddle River, NJ, 1997.
7. Alley, M. *The Craft of Scientific Writing*, 3rd Ed.; Springer: NY, 1996.
8. Booth, V. *Communicating in Science: Writing a Scientific Paper and Speaking at Scientific Meetings*, 2nd Ed.; Cambridge University Press: Cambridge, 1993
9. Online resources are extensive and include sites from other university libraries and scientific writing courses as well as publications from scientific publishers. Searching GOOGLE[®] for "Scientific Writing Chemistry" provided over 8 million hits.

6. What is your opinion of the seminar presentation and proposal in terms of:

Clarity (0-10)

Organization (0-10)

Overall comprehension of the field of study by the presenter (0-10)

Overall presentation quality (0-10)

Research proposal was realistic and well thought out (0-10)

Please include any additional comments in the space provided below.

Evaluator Name (Please print): _____