CHEMISTRY CHE 588 - Scientific Writing and Research Methods

Southern Connecticut State University

Fall/Spring/Summer Semester 20xx

Lectures: TBA

Office Hours: TBA

Text 1. 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 Overview

The course provides graduate students with transferable skills related to current literature searching, literature reviewing and interpretation, current advanced computer skills, report writing styles, and presentation skills specific to the discipline. The diverse range in age and educational background of our students requires training in the areas described in this course to provide a basic level of ability required to be successful in the program.

Course Description

Expected Student Learning Activity	Weekly Hours for Course*	Total Hours for Course (14 week semester)	Term Credits Earned
Lecture time (Contact Hours)	3	42	
Reading and Study Time	6	84	
Assignments/Problems/Reports	2	28	
Presentations	2	28	
Total Hours	**13**	**182**	**3**

*** Please note that these times are only estimates based on the Department of Education's definition of a credit hour and adjustments for the specific course by the Chemistry Department and do not guarantee a specific grade in the course. Students may find that they require more or less time to succeed in the course.**

Learner Outcomes

Upon completion of this course a student will be able to:

1. Search the scientific literature using online and bound hardcopy resources.

The student will be required to complete a thorough search of the scientific area using online tools such as SciFinder®, STNEasy®, Google® etc. consistent with the scope of the area of study and the scope of the proposed research project. The references accumulated and discussion of the relevance of the materials toward the area will serve as the assessment tool.

2. Evaluate/interpret selected literature publications for chemistry content.

The student will be required to analyze the reference materials accumulated and assess the importance of the materials in terms of the contribution each cited work makes to the field in general, as well as the narrower scope of the proposed research that is being generated from the study. This will be assessed through a short presentation and the written summary that serves as the background for the proposal. Suitable material should also be presented where it is directly relevant to the specific research proposed.

3. Evaluate/interpret selected literature publications for preferences involving writing/drawing styles. Different journal publishers use slight variations in the styles for publication and these have to be transposed to the appropriate ACS style in all written documentation and presentations. The student should be able to describe these verbally in discussions.

4. Prepare documentation using style sheets according to the ACS Style Guide and the SCSU Graduate Thesis Regulations using Microsoft Word® software. Various aspects of the assignments will require submission of written documents using the specified styles to be followed. Drafts of reports and proposals must conform to the style guidelines used by the ACS or those specific guidelines set forth in the thesis regulations.

5. Prepare chemical drawings using style sheets according to the ACS guidelines and guidelines for other national publications using ChemDraw® software. The Notice to Authors is presented in the first publication of the year for different journals and in most cases is available online. This information describes the specific settings that must be used when preparing figures, etc., with the ChemDraw® software. Assignments and the final proposal (ACS journal preferences) will be submitted and assessed on the basis of whether or not these guidelines have been followed. Visual assessment of the presentation and hard copy materials will be assessed for correct preferences, alignment, consistency, and use of characters.

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. In all materials prepared, the student should use the examples of specific formatting using bold font, italics, etc. to follow the guidelines.

7. Utilize Microsoft Excel® to prepare tabular and graphical data for presentation and analysis. As part of the overall assessment the student will demonstrate proper use of Excel software in the preparation of tables and graphs. Suitable style guidelines as indicated by the particular assignment must be followed and the guidelines for theses at SCSU will serve as the template for the proposal. The ability to adhere to the styles indicated will be used for assessment of student competence in this area.

8. Utilize additional tools available in Microsoft Word® such as Tables, Track Changes to effectively address document revision. For revised submissions, the student is

expected to learn how to use the tools housed within the software to effectively communicate the changes/revisions for written documentation.

9. Prepare presentations using Powerpoint®/ChemDraw® software according to the suggested guidelines of the ACS. As part of the overall assessment the student will demonstrate proper use of the software in the preparation of high quality presentations and chemical figures. The style guidelines must be followed and the ability to adhere to the styles indicated will be used for assessment of student competence in this area.

10. Utilize ChemDraw® software to perform calculations of ^{1}H and ^{13}C NMR spectra for molecules. The assignments will contain specific content requiring the student to utilize these tools within the ChemDraw® software to demonstrate their understanding and acquisition of the theoretical information used to compare/interpret experimental data when no literature values are available. The final proposal should contain either literature values for previously prepared compounds or expected values as a result of calculations using the program to demonstrate that the student is prepared to analyze the data from experimentation. The thoroughness of the written submissions will be assessed in this regard.

11. Utilize Chem3D® software to perform semi-empirical calculations for molecules to interpret energy surface diagrams and predict energy values for molecular orbitals. The student will use the specific tools within the software program to generate calculated energies and electron density surfaces for molecules and interpret the results as part of specific assignments. Where appropriate, the student will also be expected to include information as it pertains to the structure and bonding of compounds described as part of the research to interpret the thermodynamic stability of the proposed products. The quality of the interpretation will be assessed for assignments and other submissions.

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. The instructor 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® (accessible after 5 pm to students and faculty) and SciFinder ® software to search their research topic and begin the acquisition of articles.

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.

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®, SciFinder® and PowerPoint®.

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® , SciFinder® and other online resources available at Buley library. Searching 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:

A research proposal incorporating 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

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

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

[‡]In the case when the instructor is the research supervisor and offering the course as an independent study format, the grading and nature of the assignments, proposals, and presentations may be altered given the low faculty load credit awarded. In this case, the lectures will also be substituted for individual discussions between the instructor and the student and scheduled as required by mutual consent. The general content must still be adhered to regardless of how the course is delivered with the exception that formal presentations may be omitted at the discretion of the instructor and the proposal can be based on the research to be conducted for the thesis thereby providing the student with additional time to address the requirements for CHE589, CHE590, and CHE 591.

Letter Grade Scale:

The actual grade will be based on the grading scale given below with possible adjustment for class average at the end of the semester (at the instructor's discretion).

A+	**(100-96)**	**B+**	**(85-82)**	**C+**	**(73-70)**	**D+**	**(61-58)**
A	**(95-91)**	**B**	**(81-78)**	**C**	**(69-66)**	**D**	**(57-54)**
A-	**(90-86)**	**B-**	**(77-74)**	**C-**	**(65-62)**	**D-**	**(53-50)**
F	**<50**						

Assignments: Assignments will be distributed in class and will also be available outside my office. Complete written answers are required to receive full credit. Individual effort is required. Due dates will be indicated on the individual assignments. Assignments are due at the beginning of the scheduled lecture session.

Late/Missed Work: There will be no make-up examinations except in the case of substantiated illness (a doctor's note is required). The student must contact the professor or another member of the departmental office ***prior*** to an absence for an examination or else a grade of zero will be assigned for the examination. The same policy applies to assignments. The latter are due at the beginning of the scheduled meeting time. A doctor's note will be required upon returning to class to receive any consideration due to illness.

Accommodating Students With Disabilities: As a student with a disability, before you receive course accommodations, you will need to make an appointment with the Disability Resource Center located in EN C-105A to arrange for approved accommodations. However, if you have other information you would like to speak with me about, if you have emergency medical information to share with me, or if you need

special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible. My office is located in Jennings Hall (JE 308) and my office hours are listed on the first page. Every effort will be made to accommodate students in this course.

Inclement Weather: When inclement weather threatens, call the university's WeatherChek voice mail message line (203-392-SNOW) to hear the latest official information on possible delayed openings, class cancellations, or the closing of the university. In the event that an examination is postponed due to weather, the examination will be held at the next scheduled class meeting. Assignments will be due the following scheduled class meeting.

Academic Dishonesty: Unfortunately, the question of academic dishonesty occasionally becomes an issue between an instructor and a student. The best way to avoid this is to be sure that no suspicion arises. **Cheating on exams, assignments or any other portion of this course will not be tolerated. The student handbook outlines the various prerogatives of the instructor in cases of academic dishonesty.**

Plagiarism is considered to be an example of academic dishonesty. The Dean of Arts and Sciences has established a database of students who have plagiarized work for the purpose of disciplinary action.

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.

Chemistry 588 **Dr. Gerry Lesley**

Seminar Title:_____

Please comment on the following in terms of the presentations given in class.
Give a numerical assessment between 0 (poor) and 10 (excellent) for each category.

1. How well do you feel the basic principles governing this topic were described?

2. Was the topic presented in relation to material covered in the lecture portion of the class? (Were the appropriate written styles, guidelines, drawings, presentation styles used?)

3. What was the most interesting or unique feature of the material presented?

4. Did the presenter adequately describe the importance of the journal articles that were selected in terms of how there was a contribution toward advancement of the field of study?

5. Research proposal: Was the rationale for the proposal appropriate? Does the proposed research progress the field of study discussed? Was appropriate information provided to justify the potential success of the proposed research?

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):_____