

CHEM 595 - Research Lit & Techniques, Summer 2015

Course Description: Three semester hours. Students learn about current research by studying articles in the primary literature and preparing a scholarly review of primary literature, preparing a grant proposal or doing a smaller research project.

Class Time and Location: Lecture: F 9:00-1:00 pm; Sci 308
Laboratory: as needed

Instructor: Dr. Stephen Starnes; Sci 339, x5389, Stephen.starnes@tamuc.edu

Office Hours: M-R: 12-1 pm.

Goals of the Course: The goal of this course is to provide students an overview of research methods in general, as well as specific methods typically utilized in chemistry research. Students will learn to critically read and analyze research articles. Students are to critically review background literature and/or conduct laboratory research and prepare scientific reports. The students will work directly with Professor Starnes in the chemistry department to review and select a specific topic as the project. The final project will demonstrate a mastery of knowledge and skills in instrumentation, chemical theories and/or applications of different research methods to accomplish the project.

STUDENT LEARNING OUTCOMES:

At the successful completion of the course, students should

1. Understand the basic tenets of scientific research in various areas of investigation in chemistry.
2. Be able to identify strengths and weaknesses in the formal presentation of scientific research.
3. Be able to critically examine methods and data analysis with specific regard to the conclusions drawn by the investigators.
4. Develop skills for effective use of various literature search methods and databases such as SciFinder Scholar and Web of Science.
5. Develop skills to effectively sort and organize a large body of literature.
6. Be able to prepare professional scientific reports of journal publication quality. The final report could be the basis for a review article or grant proposal over a scientific topic of current research interest.
7. Demonstrate understanding of ethical issues and conduct in research related to human subjects if the project involves human subjects. Indicated by completion of Responsible Conduct in Research/IRB training
8. Demonstrate understanding of ethical issues and responsible conduct of research if the project involves applied chemistry research methods. Indicated by completion of Responsible Conduct in Research training.
8. Compose a research or grant proposal or final paper including :
 - a. Abstract or executive summary
 - b. Rationale
 - c. Summary of previous related studies
 - d. Description of the population and/or sample

- e. Methods to be used
- f. Budget
- g. Timeline/Scope of Work

9. Students will be able to formulate a hypothesis or identify a scientific problem.
10. Students will synthesize the literature to develop a comprehensive discussion of the problem or hypothesis that they developed.
11. Students will communicate their understanding of the problem and their synthesis of the literature in their final paper or proposal.
12. Demonstrate principles of academic integrity and intellectual ownership.

Textbooks

No text is required. Readings for the course will be obtained from contemporary peer-reviewed journals that feature research from the discipline of chemistry or chemical education.

Recommended textbooks for your perusal:

Locke, L. F., Silverman, S. J., & Spirduso, W. W. (2010). *Reading and understanding research* (3rd ed.). Thousand Oaks, California: SAGE Publications. ISBN 978-1-4129-7574-2.

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6th ed.). Washington, DC: Author. ISBN 978-1-4338-0561-5

Feedback on assignments

For most of your assignments, I will save your work, then use the “track changes” feature on the document itself to make corrections, write comments, etc. I will then return the document back to you so you will have written feedback from me. USE this information to improve your work on future assignments.

Grading: Course Requirements and Assignments:

Possible Points

| | |
|---|-----|
| First Draft – Table of Contents and Overview of Final Paper | 100 |
| Mid-term Draft Over Final Paper | 100 |
| Description of a <i>request for proposal (RFP)</i> for a grant-funded project | 100 |
| Completion of RCR/IRB modules) | 100 |
| Grant proposal or Final paper | 400 |

Your Grade (%) = Points Earned out of 800

A: ≥90.0; **B:** 80.0 ~ 89.9; **C:** 70.0 ~ 79.9; **D:** 60.0 ~69.9; **F:** <60.0

Reference List: (15% of final paper/proposal grade)

Each student will conduct a literature review for their chosen article topic and will construct an appropriate reference list. A minimum of 20 appropriate external sources must be located related to the article topic. Of these sources, a minimum of 15 must be from peer reviewed scholarly journals. **Wikipedia and other related web sites/sources are not appropriate and will not count** towards the required minimum.

Final Paper/Proposal

Each student will select a research problem and/or topic and prepare a paper or research proposal suitable for publication. The paper or research proposal should adhere to APA style. The paper should be well organized and include 1) title page, 2) abstract, 3) introduction, including review of literature, 4) methods section, 5) results section, 6) discussion/conclusion section, and 7) reference list. The paper should cite a minimum of 20 sources, 15 of which must be from peer-reviewed papers. All sources cited must be included in the reference list. **Failure to cite the appropriate source can result in a zero on this assignment.** The paper shall be created in Microsoft Word following the manuscript instructions and APA style.

Scientific Writing: A synopsis and tutorial on scientific writing, including the use of APA format is available from the Online Writing Lab at Purdue University (<http://owl.english.purdue.edu/>). Personal face-to-face assistance with editing and format suggestions is available from the on-campus Writing Center at A&M-Commerce. (See description on next page)“The Writing Center (or the “Communication Skills Center”) offers writers free, one-on-one assistance. We welcome *all* writers, majors, and disciplines—undergraduate and graduate students alike. In fact, we work from the premise that all writers, no matter their ability level, benefit from the feedback of knowledgeable readers. The Writing Center staff is trained to provide writers with just this service. In short, we are here to help you help yourself. In order to ensure the most effective session possible, we offer visitors the following suggestions: (1) Get started on your writing project early, and visit the Writing Center at least one day before your final draft is due. You will need time to work with the ideas and suggestions generated in your tutorial sessions. (2) Bring a written copy of your assignment, any relevant readings, and one or two specific questions or concerns you would like to discuss with us. We are located in the Hall of Languages, Room 103 (903-886-5280) and online at <http://www7.tamu-commerce.edu/litlang/CSC/index.htm> .”

Agenda/Schedule

| Lecture | Lecture titles | Date |
|---------|---|---------|
| 1 | Intro to class, Database searching, Human Subjects approval/IRB (for those considering a Chemical Education related topic), Responsible Conduct of Research information, Formulating a research question/hypothesis (discussion of possible topics), Discussion of research methods | June 12 |
| 2 | Purpose of research in chemistry, Scope of projects, Ethics overview, ACS style guide overview for scientific writing in chemistry | June 19 |
| 3 | Literature review and references, Critiquing Research conclusions, funding, Presenting research results | June 26 |
| 4 | First Draft of Paper/Proposal due – Overview and Table of Contents – | July 3 |

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|---|---|----------|
| | Discussion of and critique | |
| 5 | Students work on own | July 10 |
| 6 | Mid-term draft of Paper or Proposal due – Discussion and critique | July 17 |
| 7 | Students work on own | July 24 |
| 8 | Students work on own | July 31 |
| 9 | Final paper / proposal due | August 7 |

ATTENDANCE POLICY:

The Department of Chemistry adheres to the attendance policy set by the University as stated in the most current Catalog. The attendance record is kept by spot check. Being more than 5 minutes late or missing a daily assignment is equivalent to missing a lecture. Excessive absence is defined as missing more than 10% of the lectures without excusable reasons. In addition, **according to the TAMU-Commerce Procedure A13.02, if a student has excessive absences, the instructor may drop the student from the course.** The instructor will only excuse an absence if the student provides, with appropriate documents an excusable reason allowed by the TAMU-Commerce Procedure A13.02.

STUDENT CONDUCT POLICY:

All students enrolled at the University shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment (see Student's Guidebook, Policies and Procedures, Conduct, TAMU-Commerce Procedure 13.02.99.R0.06). Any student engaging in disruptive behavior will be dismissed from class on the first offence. A second offence may constitute dismissal from the course with a failing grade.

CHEATING AND OTHER BREACHES OF ACADEMIC CONDUCT:

Academic cheating, plagiarism, and other forms of academic misconduct may result in removal of the student from class with a failing grade or may in extreme cases result in suspension or expulsion from the University as described in the Code of Student Conduct section of the Student's Guidebook A&M-Commerce Procedure 13.99.99.R0.10.

STUDENTS WITH DISABILITIES:

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring an accommodation, please contact: Office of Student Disability Resources and Services, Texas A&M University-Commerce, Gee Library, Room 132, Phone (903) 886-5150 or (903) 886-5835, Fax (903) 468-8148, StudentDisabilityServices@tamuc.edu

DISHONESTY:

The reports must be written by the student. Any instance of cheating will result in a grade of “F” and result in dismissal from the course. Freedom to discuss problems does not mean that you can copy other peoples work. You must develop individual reports of your own. Blatant plagiarism will result in a grade of “F” for the course. Proven offenders will be dismissed from the research.