



COURSE SYLLABUS

I. BASIC INFORMATION

Department of Chemistry
CHE 424/425
Chemistry Research
Three (3) semester hours credit

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II. SCOPE OF COURSE

An important aspect of formal education in the sciences is the emphasis on the performance of original research. Students who major in chemistry or chemical physics are required to complete a research project culminating in a written report describing the scope of their research, the results of their experiments, and the conclusions drawn on the basis of their experimental results.

Professional men and women in science must be able to listen and read with comprehension. More crucial to the practice of their discipline is the ability to write and speak with clarity. Written and oral communication skills have been developed in chemistry students at Union University as they have moved from general chemistry and analytical chemistry through organic chemistry into upper-level chemistry courses. This course provides an opportunity for students to hone their communication skills even further. Students are also encouraged to participate in regional and national meetings where their work may be presented and discussed with other chemistry professionals.

III. COURSE OBJECTIVES

The general objectives of the course are:

1. To design and perform a series of experiments which elucidate a particular question in chemistry of the individual student's choice;
2. To write a well-documented, detailed paper describing the purpose, experimental design, procedure(s), results, and conclusions of the undergraduate research project;
3. To give a well-organized, lucid talk on the chosen subject to faculty and colleagues in the Department of Chemistry; and
4. To learn about the various chemical subject areas which interest other students of chemistry.

IV. TEXTBOOKS AND MATERIALS

The required textbook for this course is *The ACS Style Guide* (3rd edition) published by the American Chemical Society. It is the recommended style guide for authors of papers submitted to journals of the Society. The university library will provide adequate resources for the assignments in the course. The periodical literature in chemistry and related disciplines provides the textual material for this course.

V. ASSIGNED READING AND RESEARCH

The required reading for this course is focused on the reading necessary to become familiar enough with a chemical question so that a detailed research plan may be written. Continued reading in the chemical literature related to the research project is required as the experimental program dictates and the research project unfolds.

VI. SPECIAL PROJECTS/ACTIVITIES

During the semester the class will hear visiting speakers and travel to scientific meetings in the region to hear research presentations by well-known chemists. Each student is required to attend a minimum of two (2) external meetings. The trips are multi-purposed in that methods and mannerisms of speakers will be studied while learning some chemistry along the way. The characteristics of good technical presentations will be discussed. The process of developing a technical presentation that is interesting, informative, and innovative will be explored. An abstract (150 words or less in Times font) for a research poster to be presented at the 239th ACS National Meeting, March 21-25, 2010 in San Francisco, CA will be written and submitted by October 15, 2009.

Each person in the course will be expected to prepare a PowerPoint presentation describing his/her research in detail and to make the presentation to his/her fellow classmates. Each talk will also be presented during National Chemistry Week as a part of the "Brown Bag Seminar Series". A bound, hard color copy of the PowerPoint presentation complete with notes will be submitted to the instructor of the chemistry research course. Finally, a comprehensive report describing the objectives of the research, research methods and procedures, data/results of the research, interpretation and analysis of the experimental results, and the conclusions drawn on the basis of the experimental results will be written. The research journal/notebook will also be submitted for evaluation. The research journal must be signed and dated by your faculty research advisor before submission. **All of the above, a hard color copy of the PowerPoint presentation, a comprehensive research report, and the research journal/notebook are due in the office of the course instructor no later than Friday, November 20, 2009. Materials turned in after this date may incur a penalty based upon the reasons for late submission. The course instructor will determine the point deduction in consultation with the Chair of the Department of Chemistry.**

VII. METHOD OF INSTRUCTION

The methods and procedures of the course are implied in the objectives. Learning will take place by doing. The research mentor will coach the student in the completion of the research project and will provide support and encouragement as the presentation is being created and formal report is being written. The comprehensive formal research report should be of suitable length to cover the topic. It should be documented and follow the format detailed in **Section IV** of the style manual. The report is due **Friday, November 20, 2009**. Abstracts of your poster presentation for the national meeting of the American Chemical Society in New Orleans, Louisiana, this spring are due before **October 15, 2009**. Two (2) copies of the abstract should be submitted to Dr. Charles M. Baldwin and one (1) copy should be submitted to Dr. Randy F. Johnston.

The PowerPoint presentation should be well-developed and clear. The talk will generally be formulated in three parts:

1. an introduction which includes an overview of the topic and a clear definition of the limits of the problem;
2. the body of the talk which will begin with a clear statements of the goals of the project followed by a discussion of the solution to the problem with emphasis upon the results of experimentation and their interpretation; and
3. a summary which will include the conclusions drawn from experimental results and a statement of the current state of affairs so far as the problem is concerned.

The formal research report should be modeled after articles found in the refereed periodical literature of chemistry. Examples can be found in all journals of the American Chemical Society. **It is expected that students will discuss with their research mentors the deadlines set in this course (published in this syllabus) and will take the initiative to be sure that their mentors are involved in the preparation of the PowerPoint presentation and the formal research report. This process should begin in earnest during the first two (2) weeks of the semester.**

VIII. METHOD OF EVALUATION

Each student's grade in the course shall be determined by his/her performance on the PowerPoint presentation to the research class and during National Chemistry Week, the formal research paper, and participation in the lecture trips. Each student may accumulate a total of 1000 points. Although the instructor will ultimately determine the final course grade, feedback on every student talk will be sought. Helpful comments may be shared privately with the speaker.

Each activity shall be weighted as follows:

<u>Activity</u>	<u>Points</u>
Formal Research Report	400
Research Journal	200
Class Talk	150
National Chemistry Week Talk	150
Lecture Trips/Special Seminars	100
TOTAL	1000

The final course grade will be assigned utilizing the following scale.

<u>Total Points</u>	<u>Course Grade</u>
1000-900	A
800-899	B
700-799	C
600-699	D
Below 600	F

These evaluation procedures are subject to ratification by the class at its first meeting.

Assignment due dates are as follows:

<u>Activity</u>	<u>Date</u>
PowerPoint Presentation Due	Friday, November 6, 2009
Laboratory Research Journal Due	Friday, November 21, 2009
Formal Research Report Due	Friday, November 21, 2009

IX. ATTENDANCE POLICY

It should be recognized that courses of study which are most worthwhile are those which evoke much study and preparation by the student and the instructor. It is the instructor's opinion (and personal goal) that each class meeting will be worthy of the student's attendance and participation. Since excessive absences will render impossible the achievement of the course objectives, no unexcused absences will be permitted during the semester without grade penalty. **Each unexcused absence will carry a 50 point deduction per absence.** This includes the lecture trip seminars (at least 2) which provide invaluable interaction with other chemistry students and faculty with similar professional and academic interests. Students are responsible for all material covered in class and should obtain classnotes from fellow class members when absences do occur.

During the semester there will be opportunity to attend Section meetings of the American Chemical Society (Memphis, Kentucky Lake, and/or Nashville) and chemistry department seminars (Vanderbilt University and the University of Memphis). Usually we leave early enough to eat dinner before attending the meeting/seminar. Attendance at these meetings may serve as a make-up for anyone who has sustained a deduction for an unexcused absence.

X. COURSE SCHEDULE

<u>DATE</u>	<u>TOPIC</u>	<u>SPEAKER/ACTIVITY</u>
August 28	Course Orientation	
September 4	PowerPoint Workshop	
September 11	<i>“Computing Steric Contributions and Potential Energy Surfaces of Retinoids”</i>	Dr. Tracy P. Hamilton Univ. of Alabama Birmingham
September 17	Kentucky Lake ACS Section Meeting-Union University	Dr. David Sevier Deputy Executive Director TN State Board of Education
September 18	Research Presentations	(2)
September 25	Research Presentations	(2)
October 2	Research Presentations	(2)
October 9	Research Presentations	(2)
October 15-19	Fall Holidays	
October 20-25	National Chemistry Week	Brown Bag Seminars (M-F, Noon)
October 22	KLACS Demo Night	University of Tennessee at Martin Martin, TN
October 23	SAACS Formal Dinner	TBD
October 30	Tennessee Academy of Science	University of Tennessee at Knoxville
November 6-7	Tennessee Science Teachers Association Annual Conference	Marriott Cool Springs Franklin, Tennessee
November 6	PowerPoint Presentation Due (Bound color copy with notes)	

<u>DATE</u>	<u>TOPIC</u>	<u>SPEAKER/ACTIVITY</u>
November 20	Research Report and Journal Due	
November 25-29	Thanksgiving Holidays	

XI. BIBLIOGRAPHY

- The ACS Style Guide*; 3rd ed.; Dodd, J., Ed.; American Chemical Society: Washington, DC, 1986.
- Wiggins, G. *Chemical Information Sources*; McGraw-Hill: New York, 1991.
- Day, R. A. *How to Write and Publish a Scientific Paper*; ISI: Philadelphia, 1979.
- Mellon, M. G. *Chemical Publications Their Nature and Use*; 5th ed.; McGraw-Hill: New York, 1982.
- Margolin, J. B. *The Individual's Guide to Grants*; Plenum: New York, 1983.
- Tichy, H. J. *Effective Writing for Engineers, Managers, and Scientists*; John Wiley: New York, 1966.
- Tocci, V. *The Chemist and the Media*; American Chemical Society: Washington, DC, 1984.
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- Dewar, M. J. S. *A Semiempirical Life*; American Chemical Society: Washington, DC, 1992.
- Roberts, J. D. *The Right Place at the Right Time*; American Chemical Society: Washington, DC, 1990.
- Ebel, H. F., Bleifert, C. and Russey, W. E. *The Art of Scientific Writing: From Student Reports to Professional Publications in Chemistry and Related Fields*; VCH: New York, 1987.
- Jolly, W. L. *The Synthesis and Characterization of Inorganic Compounds*; Waveland: Prospect Heights, IL, 1991.
- Potera, C. "The Basic Elements of Writing a Scientific Paper: The Art of Scientific Style" in *J. Chem. Ed.* **1984**, 61(3), 246-247.
- Zimmerman, S. S. "Writing for Chemistry" in *J. Chem. Ed.* **1978**, 55(11), 727.

[TITLE]

(All caps, 18-24 pt, bold, centered)

RESEARCH REPORT

(All caps, 18-24 pt, bold, centered)

**Submitted in partial fulfillment
of the requirements for:**

CHE 424-425
Chemical Research
Fall Semester, 2009
Instructor
Research Mentor

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[Name]
[Date]

(14 pt, plain, right-justified)

CHEMISTRY SEMINAR

(Times 28-36 pt, Bold, All Caps, Centered)

**Building
Room Number
Date
Time**

“Title”

(Times 28-36 pt, Bold, Italicized, Centered)

**Name and Picture
(Passport-type, centered)**

**Abstract and References
(2-3 general references introducing attendees to topic of talk,
ACS Style Guide format)**

CHEMISTRY SEMINAR

White Hall
Room 318
September 11, 2009
12:00 noon

*“Computing Steric Contributions and
Potential Energy Surfaces of Retinoids”*



Dr. Tracy P. Hamilton
University of Alabama at Birmingham

1. Muccio D, Brouillette W, Breitman T, Taimi M, Emanuel P, Zhang X, Chen G, Sani B, Venepally P, Reddy L, Alam M, Simpson-Herren L, Hill D. Conformationally Defined Retinoic Acid Analogues. 4. Potential New Agents for Acute Promyelocytic and Juvenile Myelomonocytic Leukemias. *J. Med. Chem.* **1998**, *41*, 1679-1687.
2. Guo H, Karplus M. Ab Initio Studies of Methylated 1,3-Butadienes. *J. Mol. Struct. (THEOCHEM)* **1992**, *250*, 347-393.