CHEM 551: Research

(Section 001, 3 Credit Hrs)

Fall 2021

Course Coordinator: Dr. Jason C. Hurlbert
Office: Sims 301B
Email: hurlbertj@winthrop.edu
Office Phone: 323-4928
Course Website: http://chem.winthrop.edu/faculty/hurlbert/link_to_webpages/courses/chem551/chem551home.html
Office Hours: T 5:00-6:00PM, R 12:00 PM to 1:00 PM, F 11:00-12:00PM and by appointment

Lecture: Fridays 8:00 – 8:50 AM via Zoom

The tentative schedule is posted on the course web page (chem.winthrop.edu)

Required Materials:

The ACS Style Guide, 3rd ed., Coghill and Garson, 2006.

Course Goals:

CHEM 551 is the first of a two-semester sequence that provides a faculty-mentored research experience that exposes undergraduates to hypothesis-based investigations in chemistry. The goals of this course align with ***University Level Competency (ULC) #1*** – "Winthrop graduates think critically and solve problems," and ***ULC #4*** "Winthrop graduates communicate effectively."

- To develop and utilize the critical thinking and analytical reasoning skills needed to design scientific experiments, and analyze and interpret the resulting data
- To effectively communicate their findings through written research papers and oral presentations

Course Learning Outcomes:

During the Research sequence (CHEM 551 – 552), the student will learn to:

- Use scientific databases such as SciFinder and PubMed to access primary literature
- Read and appreciate the significance of relevant journal articles
- Design and carry out experiments using relevant instrumentation and techniques
- Analyze and interpret scientific data with respect to their research goal
- Write, review, and revise a formal report of their research in the form of a scholarly article
- Make presentations of their work to faculty who specialize in various chemistry disciplines

Graduate Students:

To receive graduate credit for this course, you will be required to compose a 5-7 page paper and give a 20 minute presentation on a topic that is not directly related to your project but agreed upon with your research mentor. The paper must contain at least 15 references and be formatted following the ACS guidelines. This assignment will be worth an additional 150 points, and graduate students should note that the plus/minus grading system will not be used.

General Course Expectations:

- **Choose a research mentor** Interview at least three (3) faculty and complete the Project Selection Form (available from the instructor). Submit the form to the Chemistry, Physics and Geology Department Chair prior to registering for the course.
- **In consultation with your mentor, choose a research committee.** Your research committee consists of your mentor and two (2) other faculty members. *In consultation with your mentor, secure agreements from two other faculty members to serve on your committee, one of whom should serve as committee chair.* Your mentor and research committee will monitor your progress and provide guidance as needed. They will also evaluate your work.
- **Meet with your research mentor at least once per week.** He/she will provide you with instruction in the required techniques and instrumentation, and make you aware of potential hazards and proper safety protocols. He/she will also be the first reviewer of your oral and written work.
- **Devote at least 9 hours per week to your project**. This does not include the time you will spend on other assignments (writing assignments, preparation time, etc.).
- **Attend each scheduled class meeting for the full time**. Each unexcused absence will lower your course grade by one level (e. g. B to B-). Per Winthrop attendance policy, you must attend at least 75% of the class meetings to pass the course.
- **Complete any assigned readings or other required assignments prior to class** so you can contribute to class discussions. These assignments are outlined in the course schedule.
- **Complete all written and oral assignments as scheduled**. You should pay careful attention to due dates for both first drafts to mentors and final versions to instructor, mentor, and committee. A 10% per day penalty will be assessed for each day the assignment is late (including weekends and holidays). These assignments will be discussed further below.
- Adhere to the Winthrop Student Conduct Code as outlined in the Student Handbook: (http://www2.winthrop.edu/studentaffairs/handbook/StudentHandbook.pdf)

Final Course Grade:

The final grade for the course will be based on the percentage of total points earned in the course and assigned as follows:

A = 93.0 – 100.0%, A^- = 90.0 – 92.9%; B^+ = 87.0 – 89.9%, B = 83.0 – 86.9%,

C^+ = 77.0 – 79.9%, C = 70.0 – 76.9%; D = 60.0 – 69.9%; F= < 60.0%.

Withdrawals:

Per Winthrop University policy, any student who wishes to withdraw from the course with a grade of "N" must do so before the Course Withdrawal Deadline (***Thursday, December 3, 2020***).

Incomplete Grades:

Assigning an incomplete grade indicates that, for a valid reason, the course cannot (and has not) been completed during the semester. If warranted, you should discuss the possibility of an incomplete grade with your mentor and the course coordinator at the earliest possible time. Please note that assignment of an incomplete grade must include a justification validated by the University's Dean of Students.

NOTE: Grade discussions will only be held in person. No grades will be communicated by phone or e-mail.

Students with Disabilities/Need of Accommodations for Access:

Winthrop University is committed to providing access to education. If you have a condition which may adversely impact your ability to access academics and/or campus life, and you require specific accommodations to complete this course, contact the Office of Accessibility (OA) at 803-323-3290, or accessibility@winthrop.edu. Please inform me as early as possible, once you have your official notice of accommodations from the Office of Accessibility.

Changes to Syllabus: Any changes to the syllabus or course schedule will be announced in class.

Course Assignments

PLEASE NOTE: DUE TO COVID-19 PROTOCOLS AND CONSTRAINTS, CHEM551 WILL BE EITHER A VIRTUAL LABORATORY EXPERIENCE OR AN IN-PERSON LABORATORY EXPERIENCE, DEPENDING ON THE STATUS OF THE CAMPUS AND THE AGREEMENT BETWEEN THE STUDENT AND THEIR MENTOR. AS SUCH, ANY COMBINATION OF THE FOLLOWING ASSIGNMENTS MAY BE SELECTED DEPENDING UPON THE CIRCUMSTANCE AND THE MENTOR.

In a traditional CHEM551 arrangements, the following General Assignments (due dates are listed on the course schedule) would be required:

1. **Course Contract (25 pts, recorded by coordinator):** After interviewing three (3) potential faculty mentors, select a research mentor (*be sure to verify that he or she is available to mentor you*). In consultation with your mentor, choose a research committee, and complete the course contract. This is an individual, signed agreement between student, mentor, and committee members outlining the expectations and goals for the semester. *Specific guidelines and an example can be found on the course website. Copies of the completed course contract must be given to all parties involved, and to the course coordinator (Dr. Hurlbert). Please note that failure to satisfy the requirements of the course contract may result in a grade of "F" for the course.*
2. **Project Safety Summary, Safety Training, and Safety Quiz (25 pts, recorded by coordinator):** ***Using the template on the course webpage,*** a description of materials and methods, hazards, and safety precautions to be encountered in the course of the semester is to be completed in consultation with the faculty mentor. Students are also required to attend a safety training session, to be given by Dr. Snyder near the beginning of the semester (dates, times, and room nos. will be announced in class). You must pass the associated safety quiz with 100% score. *Failure to attend safety training or pass the safety quiz will immediately revoke eligibility to conduct research and your enrollment in the research course.*
3. **Laboratory Notebook (75 pts, grade submitted by mentor):** The mentor will assign grades based on format, neatness, organization and detail.
4. **Laboratory Technique (75 pts, grade submitted by mentor):** The mentor will assign grades based on the quality of student's laboratory performance.
5. **Laboratory Safety (100 pts, grade submitted by mentor):** The mentor will assess the student's laboratory hygiene and safety practices.
6. **Class Participation (100 pts, grade assigned by coordinator):** Each student is expected to be prepared for class discussions and actively participate in course meetings. This includes occasional peer review of written assignments. In addition, students may be required to give brief in-class presentations over the course of the semester.

Written Assignments (due dates are listed on the course schedule; grades submitted by each individual committee member):

- **NOTE: Written assignments must be submitted to your mentor for feedback by the due dates listed on the course schedule. This feedback must be incorporated into your document prior to being submitted to your committee for grading.**

7. **Literature Summaries (100 pts):** A directed investigation of the scientific literature relevant to the specific project and broader field of research must be completed. Searches will employ appropriate databases (e. g. SciFinder); students will receive guidance in the use of these databases in class. The student is required to a short (2 – 3 sentences) project description, along with summaries of **at least ten (10) sources** (books, articles, etc.). *Specific guidelines and an example can be found on the course webpage*

8. **Written Proposal (100 pts):** An in-depth description of the goals, methods, and impact of the two-semester research project. The written proposal should contain the information discussed in class, including sections covering the Background and Significance of the project, Specific Aims (or Project Goals), Methods, Estimated Timeline, and Literature Cited. *Specific guidelines and some examples can be found on the course webpage*

9. **Title/Introduction (100 pts):** An initial draft of the title and introduction section of the final paper. This section must include ***at least 7 references*** from peer-reviewed sources, with in-text citations and endnotes in the format detailed in class. You should also incorporate any committee feedback obtained from your written and oral proposals into this document.
   Examples can be found in the primary literature of your discipline

10. **Revised Title/Intro + Methods and Results (100 pts):** (1) A revised draft of Written Assignment #3 (Title/Introduction), 2) an initial draft of your Experimental/Methods section, and 3) an initial draft of the Results section of your paper (using tables, graphs, etc. as necessary). You should include additional in-text citations and endnotes where appropriate. NOTE: Some authors may choose to combine the Results and Discussion sections.
    Examples can be found in the primary literature of your discipline

11. **551 Final Paper (200 pts):** A draft of the final paper, including the revised Title, Introduction, Experimental/Methods, and Results sections. You should incorporate any feedback received on your previously graded assignments from your mentor and committee. This draft must be fully referenced (minimum of 10 peer-reviewed sources), with in-text citations and endnotes in the required format.
    Examples can be found in the primary literature of your discipline

Oral Assignments (due dates are listed on the course schedule; grades determined by committee consensus):

- **Oral assignments must be discussed with your mentor for feedback prior to any presentation – formal or informal.**
- **You are responsible for coordinating the specific time with your committee as well as securing the room.**
- **Your committee presentations serve as a starting point to assess your deeper knowledge of chemistry. Therefore you should expect questions not directly related to your presentation.**

12. **Committee Meeting #1 (Oral Research Proposal) (100 pts):** A 15 – 20 minute oral PowerPoint presentation to your research committee on the background and justification for your research project, as well as your research plans for the academic year.

13. **Committee Meeting #2 (Oral Progress Report) (100 pts):** A 15 – 20 minute oral PowerPoint presentation to your research committee which will include a short review of the background, justification, and plans for your project, followed by a detailed presentation of the progress you have made and any further plans for the remainder of the semester.

14. **551 Final Presentation (200 pts):** In lieu of a traditional final exam, you will give a 10 - 12 minute oral PowerPoint presentation of the semester's work to the entire department. The successful presenter will: (1) provide a complete introduction to the goals and significance of the project and the techniques employed, (2) describe experimental methods utilized and results obtained thus far and (3) address specific plans for the following semester. Grades will be submitted by the faculty who attend the presentation.

Total points available: 1400