

CHEM 552H: Research II – Honors Credit

(Section 001, 3 Credit Hrs)

Spring 2024

*“Research is formalized curiosity. It is poking and prying with a purpose”
– Zora Neale Hurston*

Course Coordinator: Dr. Jay Hanna

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Course Website: chem.winthrop.edu

Office Hours: M 3:00 – 4:30 pm

To contact me outside of these hours, please feel free to e-mail or call to make an appointment. I check my email and phone messages periodically throughout the day.

E-mail: Occasionally, important course information will be communicated through e-mail, and you may also communicate with the instructor by e-mail. However, remember that e-mail communication is formal business correspondence and should be written as such. The instructor reserves the right to ignore informal or poorly constructed e-mails.

Lecture: F 9:00 – 9:50 am in Sims 113B

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.

A Short Guide to Writing About Chemistry, Davis, Tyson, and Pechenik, 2010.

Course Goals: CHEM 552 is the second 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 search and 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:

- **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 laboratory research.** This does not include the time you will spend on other assignments (writing assignments, preparation time, etc.). Per Winthrop attendance policy, you must complete at least 75% of your scheduled lab time to pass this course.
- **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.
- **Anything not required for the class discussion (e. g. cell phones, computers, cameras, and other devices) cannot be used during class time.**
- 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%, B⁻ = 80.0 – 82.9%

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 (**Wednesday, March 9, 2016**).

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

General Assignments (due dates are listed on the course schedule):

1. **Updated Course Contract (25 pts, recorded by coordinator):** In consultation with your mentor, update your CHEM 551 course contract.

Copies of the completed course contract must be given to all parties involved, and to the course coordinator (Dr. Hanna). Please note that failure to satisfy the requirements of the course contract may result in a grade of "F" for the course.

2. **Laboratory Notebook (75 pts, grade submitted by mentor):** The mentor will assign grades based on format, neatness, organization and detail.
3. **Laboratory Technique (75 pts, grade submitted by mentor):** The mentor will assign grades based on the quality of student's laboratory performance.
4. **Laboratory Safety (100 pts, grade submitted by mentor):** The mentor will assess the student's laboratory hygiene and safety practices.
5. **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 in-class presentations and peer review of written assignments.

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.**

6. **Revised Title/Intro/Methods/Results + Discussion (100 pts):** (1) A revised version of your Title, Introduction, Methods (Experimental) and Results sections, including the latest data you have obtained. (2) A draft of the Discussion section of your paper where you interpret your results and explain their significance in the context of the current knowledge in the field, and draw conclusions based on the evidence presented. 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

7. **552 Final Paper (200 pts):** The complete final research paper consisting of the revised Title, Abstract, Introduction, Experimental/Methods, Results, Discussion, and References sections. You should incorporate any feedback received on your previously graded assignments from your mentor and committee. This final paper must be fully referenced (**minimum of 15 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 submitted by committee as a whole):

- **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.**
8. **“Elevator Talk” (100 pts):** A 2 – 3 minute in-class presentation about your research project aimed at potential employers, friends, and family.
 9. **“Presentation to the Rotary Club” (100 pts):** An informative 10 minute in-class presentation about your research project geared toward non-science professionals.
 10. **Committee Meeting (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 (results and discussion) and any further plans for the remainder of the semester.
 11. **Final Presentation (200 pts):** In lieu of a traditional final exam, you will give a 10 – 12 minute oral PowerPoint presentation of your project 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, (3) discuss the interpretation and implications of the results, and (3) briefly describe any possible future directions for the project. Grades will be submitted by the faculty who attend the presentation.
 12. **Additional Committee Meeting (150 pts):** To receive honors credit for this course, *you will give a 30 – 40 minute presentation to your committee on a journal article* to be selected in consultation with (and approved by) your mentor. The journal article should not be directly related to your research project, but may fall within your general area of study. You should schedule 1.5 hr for your presentation to allow time for in-depth Q&A from your committee. Your presentation should include:
 - Enough experimental background to frame the goals of the work presented
 - The goals of the research presented
 - The techniques used as well as their theoretical basis
 - Experimental data obtained and interpret the results
 - Conclusions, future work and relevance to the experimental field

Note that this presentation serves as a starting point for your committee’s assessment of your broader/deeper knowledge of chemistry, so you should expect questions about topics not necessarily directly related to your paper.

Total points available: 1325