CHEMISTRY CHE 491 – Chemistry Research II
Southern Connecticut State University

Fall/Spring/Summer Semester 20xx

Scheduled meetings with research adviser to be determined.

Pre-requisite: CHE 490

Course Overview and Requirements

This is a 3-credit course for the completion of the senior thesis in consultation with the research adviser. The guidelines for the thesis are described in the department undergraduate research guidelines available online or from the department office. The main body of the document should adhere to ACS style preferences. The second semester of mentored research provides additional time to complete the research project proposed in CHE 490 and the final thesis document. The student must also complete an oral thesis defense.

The student and faculty research adviser will schedule meetings as appropriate for the completion of the thesis by the deadline. The student must submit the thesis to the Department and Thesis Committee two weeks prior to the oral thesis defense. The members of the Thesis Committee will return the thesis with the evaluations (written thesis) and comments at the oral defense. A copy placed on display for all other department members should also have comments from each of the additional faculty readers and will be available to the student at the defense. All suggested changes/recommendations must be addressed prior to submission of the final draft to the department for approval. A signature sheet for faculty who are not Thesis Committee members should be included as the first page of the copy on display in the Chemistry office.

The student must also give a scheduled 30-minute presentation of the thesis and the results obtained during the period of research. This should be in a Powerpoint® presentation format and should be of high quality containing appropriate ChemDraw® figures, etc. This will be followed by an open question and discussion period where the student is expected to answer questions related to the literature background as well as the results obtained during the research.

It is the responsibility of the student and research adviser to ensure the deadlines are met. No extensions or special considerations will be made regarding the deadlines imposed.
<table>
<thead>
<tr>
<th>Expected Student Learning Activity</th>
<th>Weekly Hours for Course*</th>
<th>Total Hours for Course (14 week semester)</th>
<th>Term Credits Earned</th>
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</thead>
<tbody>
<tr>
<td>Contact Hours</td>
<td>9</td>
<td>136</td>
<td></td>
</tr>
<tr>
<td>Reading and Study Time</td>
<td>2</td>
<td>28</td>
<td></td>
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<tr>
<td>Reports</td>
<td>2</td>
<td>28</td>
<td></td>
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<tr>
<td>Presentations</td>
<td>2</td>
<td>28</td>
<td></td>
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<tr>
<td><strong>Total Hours</strong></td>
<td><strong>15</strong></td>
<td><strong>220</strong></td>
<td><strong>3</strong></td>
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</tbody>
</table>

* 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. Complete a search the scientific literature using online and bound hardcopy resources for the proposed research area. 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. (INTASC 1, 4, 6, NSTA 1, 2, 3, 4, 10, CCCT 1.3, 1.4, 2.5, 2.6)

2. Apply the concepts taught in CHE 301 as they apply to the current research topic. 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 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 reactions proposed. (INTASC 1, 4, 6, NSTA 1, 2, 3, 4, 10, CCCT 1.3, 1.4, 2.5)

**Evaluation:** There are two components for evaluation. The written thesis will account for 75% of the final grade and the oral defense will count for 25% of the final grade. The evaluation of each component is described below.

The members of the Departmental Thesis Committee complete the evaluation of the written thesis. The evaluation involves a pass or conditional pass or fail grade to various components of the written thesis as outlined in the faculty evaluation document included below. Each committee member will assign a letter grade after reviewing the final thesis document and the final grade for the course will be the average of the letter grades assigned by the committee (25%) and the faculty research adviser (75%).

All full time faculty members in the department will evaluate the oral thesis defense. The evaluation involves a pass or conditional pass or fail grade to various components of the oral thesis defense as outlined in the faculty evaluation document included below. Each committee member will assign a letter grade after the oral thesis defense and the final grade for the course will be the average of the letter grades assigned by the full time faculty (25%) and the faculty
research adviser (75%). The research adviser may petition for a revision to the grade with the full-time faculty members if he/she feels an unwarranted grade has been awarded.

**Late/Missed Work:** There is no mechanism for late submission.

**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. No accommodation regarding the deadline will be permitted.

**Academic Dishonesty:** Unfortunately, the question of academic dishonesty occasionally becomes an issue between an instructor and a student. **Plagiarism** is a serious example of academic dishonesty especially when it pertains to thesis exercises and this will not be tolerated. The penalty for plagiarism will be a grade of zero and if the Departmental Thesis Committee deems the extent of plagiarism to be extensive, removal from the program will result.
### INTASC STANDARDS

[Interstate New Teachers’ Assessment & Support Consortium]

| S | 1. Knowledge of subject matter  
2. Knowledge of human development & learning  
3. Instruction adapted to meet diverse learners  
4. Use of multiple instructional strategies & resources |

| A | 5. Effective learning environment created  
6. Effective communication  
7. Lesson planning |

| I | 9. Reflection and professional development |

| L | 8. Assessment of student learning to improve teaching |

| S | 10. Partnership with school and community |

### PROFESSIONAL STANDARDS

National Science Teacher’s Association

1. Content – Structure and interpret the concepts, ideas and relationships in science.

2. Nature of Science – Define the values, beliefs and assumptions inherent to the creation of scientific knowledge within the scientific community.

3. Inquiry – Formulating solvable problems, constructing knowledge from data, exchanging information for seeking solutions, developing relationships from empirical data.

4. Context of Science – Relate science to daily life: technological, personal, social and cultural values.

5. Skills of Teaching – Science teaching actions, strategies and methodologies, interaction with students, effective organization and use of technology.

6. Curriculum – Extended framework of goals, plans, materials and resources for instruction.

7. Social Context – Social and community support network, relationship of science to needs and values of the community, involvement of people in the teaching of science.

8. Assessment – Alignment of goals, instruction and outcomes, evaluation of student learning.


10. Professional Practice – Knowledge and participation in the professional community, ethical behavior, high quality of science instruction, working with new colleagues as they enter the profession.

### CCCT

[Connecticut Common Core of Teaching]

#### DEMONSTRATIONS OF KNOWLEDGE

1.1 understanding of student learning & development  
1.2 understanding of need for different learning approaches  
1.3 proficiency in reading, writing and mathematics  
1.4 understanding of central concepts & skills, tools of inquiry and structures of discipline(s)  
1.5 knowledge of how to design and deliver instruction  
1.6 recognition of need to vary instructional methods

APPLICATION OF KNOWLEDGE THROUGH

2.1 instructional planning based upon knowledge of subject, students, curriculum & community  
2.2 selection and/or creation of learning tasks that make subject meaningful for students  
2.3 establishment and maintenance of appropriate behavior standards and creation of positive learning environment  
2.4 creation of instructional opportunities supporting students’ academic, social and personal development  
2.5 use of verbal, nonverbal and media communication fostering individual and collaborative inquiry  
2.6 employment of various instructional strategies in support of critical thinking, problem solving and skills demonstration  
2.7 use of various assessment techniques to evaluate student learning & modify instruction

#### DEMONSTRATION OF PROFESSIONAL RESPONSIBILITY THROUGH:

3.1 professional conduct in accordance with the Code of Professional Responsibilities for Teachers  
3.2 shared responsibility for student achievement and well-being  
3.3 continuous self-evaluation regarding choices & actions on students and school community  
3.4 commitment to professional growth  
3.5 leadership in the school community  
3.6 demonstrations of a commitment to students and a passion for improving the profession
Departmental Thesis Review

Written Thesis Evaluation

The Department of Chemistry at SCSU has outlined several components for the acceptance of thesis research in the undergraduate and graduate programs. The following items were evaluated by a member of the Departmental Thesis Committee and graded as pass, conditional pass, or fail. A letter grade considering all of the areas for assessment is included at the end of the document.

1. The literature review was thorough and appropriate for the study that was conducted and was updated for any material published while the research was being conducted.
   
   Pass ☐  Conditional Pass ☐  Fail ☐

2. There is a clear statement of the completed research and how the results advance the current body of knowledge.
   
   Pass ☐  Conditional Pass ☐  Fail ☐

3. The thesis adheres to current American Chemical Society standards including those pertaining to the suggested styles for written documentation.
   
   Pass ☐  Conditional Pass ☐  Fail ☐

4. Citations follow the current American Chemical Society standards.
   
   Pass ☐  Conditional Pass ☐  Fail ☐

5. Figures and schemes were presented in a suitable format using ChemDraw® software or proper permission was obtained and included to reproduce figures, etc.
   
   Pass ☐  Conditional Pass ☐  Fail ☐

6. The organization of the body of the report is consistent with current standards in the Department of Chemistry.
   
   Pass ☐  Conditional Pass ☐  Fail ☐

7. The thesis document reflects an appropriate effort in terms of the scope and limitations of the research conducted.
   
   Pass ☐  Conditional Pass ☐  Fail ☐
8. The overall quality of the thesis reflects the standards set forth by the Department of Chemistry.

   Pass ☐     Conditional Pass ☐     Fail ☐

Additional Comments:

Reviewed by: ________________________ (Print Name) Date: ________________

Faculty Signature ________________________ Recommended Letter Grade
Departmental Thesis Review

Oral Thesis Defense Evaluation

The Department of Chemistry at SCSU has outlined several components for the acceptance of thesis research in the undergraduate and graduate programs. The following items were evaluated by a full-time departmental member and graded as pass, conditional pass, or fail pertaining to the oral defense of the research conducted. A letter grade considering all of the areas for assessment is included at the end of the document.

1. Key aspects of the current literature and relevance to the work conducted were presented.
   Pass ☐ □ Conditional Pass ☐ ☐ Fail ☐ ☐

2. There was a clear statement of the completed research and in general, a clear description of how the results advance the current body of knowledge.
   Pass ☐ ☐ Conditional Pass ☐ ☐ Fail ☐ ☐

3. The student demonstrated that he/she had attained a thorough knowledge of the field of study and this was apparent in the quality of the presentation.
   Pass ☐ ☐ Conditional Pass ☐ ☐ Fail ☐ ☐

4. The student demonstrated that he/she had attained a thorough knowledge of the field of study and this was apparent in the quality of the answers in the question period following the defense.
   Pass ☐ ☐ Conditional Pass ☐ ☐ Fail ☐ ☐

5. Appropriate citations (ACS style) were included in the presentation materials.
   Pass ☐ ☐ Conditional Pass ☐ ☐ Fail ☐ ☐

6. Appropriate figures, schemes, tables, etc., were included in the presentation materials.
   Pass ☐ ☐ Conditional Pass ☐ ☐ Fail ☐ ☐

7. The presentation was consistent with the allotted time allocated for the thesis defense.
   Pass ☐ ☐ Conditional Pass ☐ ☐ Fail ☐ ☐

8. The student gave a clear presentation and did not just read the slides presented.
   Pass ☐ ☐ Conditional Pass ☐ ☐ Fail ☐ ☐
Additional Comments: (please attach a separate page if more space is required)

Reviewed by: ________________________ (Print Name)  Date: ________________

________________________________________________________________________

Faculty Signature  Recommended Letter Grade