Syllabus: CHM 480: Organic Chemistry Capstone

Course Title: CHM 480: Organic Chemistry Capstone

Semester: Fall 2024

Instructor: Dr. Alice Thompson

Email: athompson@asu.edu

Office: SANCA 310A, The Polytechnic School, ASU

Office Phone: (480) 727-6300

Office Hours: Wednesdays 2:00-4:30 PM OR by appointment

Class Time & Place: Tuesday or Thursday 3:00-4:15 PM in SANCA 315

Course Description:

This capstone course focuses on the synthesis and characterization of novel organic compounds with potential applications in pharmaceuticals or materials science. Students will design, synthesize, and optimize an organic compound, culminating in a presentation of their findings at the Innovation Showcase. The course includes the development of a project proposal, synthesis planning, laboratory work, and a final report.

Course Objectives:

Design and synthesize a novel organic compound.

Characterize the compound using advanced techniques.

Optimize synthesis conditions for improved yield and purity.

Effectively present the project at the Innovation Showcase.

Learning Outcomes:

Gain expertise in organic synthesis and characterization techniques.

Develop practical skills in laboratory research and data analysis.

Improve communication skills through written reports and presentations.

Enhance the ability to manage complex chemistry projects from conception to completion.

Group Project and Required Subtasks:

The group project for this course will involve designing and synthesizing a novel organic compound with potential applications in pharmaceuticals or materials science. The project will be broken down into the following subtasks:

1. **Project Proposal (Week 3):**
   - Create a proposal detailing the objectives, the compound being synthesized, and the anticipated impact. Include a timeline and assign roles to team members.

2. **Literature Review and Synthesis Planning (Weeks 4-6):**
   - Conduct a thorough literature review to identify existing methods and gaps. Plan the synthesis route, including reagents, conditions, and techniques.

3. **Synthesis and Characterization (Weeks 7-10):**
   - Carry out the synthesis in the laboratory. Characterize the compound using techniques such as NMR, IR, and mass spectrometry.

4. **Optimization and Yield Improvement (Weeks 11-12):**
   - Optimize the synthesis conditions to improve yield and purity. Conduct additional tests to confirm the structure and properties of the compound.

5. **Final Report and Presentation (Weeks 13-15):**
   - Document the entire synthesis process, including challenges, solutions, and outcomes in a final report.
   - Prepare a presentation and poster for the Innovation Showcase that highlights the key aspects of the project.

Groups are expected to collaborate closely, meeting regularly to discuss progress and resolve any issues. Instructor check-ins will be scheduled to provide guidance and feedback.

Evaluation:

Class meetings (5): 20 points

Individual meetings (3): 12 points

Project Proposal: 10 points

Literature Review and Synthesis Planning: 15 points

Synthesis and Characterization: 18 points

Optimization and Yield Improvement: 10 points

Final Report: 10 points

Presentation: 5 points

Poster: 10 points

Total: 100 points

Course Policies:

Attendance and Participation: Regular attendance and active participation are crucial for success in this course. Students are expected to attend all scheduled class meetings and individual sessions. If a student is unable to attend a class, they should inform the instructor in advance and arrange to complete any missed work.

Academic Integrity: All students must adhere to ASU's academic integrity policy. Any form of academic dishonesty, including plagiarism, will be reported and may result in severe penalties, including a failing grade for the course.

Accommodations: Students with disabilities or special needs should contact the ASU Disability Resource Center to arrange appropriate accommodations and notify the instructor as soon as possible.

Important Dates:

Class Week 1: Introductions & Project Brainstorming (Aug 26)

Individual Meeting #1: Discuss Ideas and Readings (Sep 4)

Class Week 2: Proposal Presentation & Group Feedback (Sep 18)

Individual Meeting #2: Proposal Feedback & Methods Discussion (Oct 2)

Class Week 3: Revised Proposal Presentation & CERTT Tour (Oct 23)

Individual Meeting #3: Data Analysis & Progress Review (Nov 13)

Class Week 4: Professional Development & Project Discussion (Nov 27)

Innovation Showcase: Final Presentations & Poster Display (Dec 6)