Syllabus: CHM 483: Analytical Chemistry Capstone

Course Title: CHM 483: Analytical Chemistry Capstone

Semester: Fall 2024

Instructor: Dr. Matthew Chen

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

Class Time & Place: Monday or Wednesday 3:00-4:15 PM in SANCA 345

Course Description:

This capstone course focuses on the development and validation of analytical methods for detecting and quantifying specific compounds in complex matrices. Students will design, validate, and apply an analytical method, culminating in a presentation of their findings at the Innovation Showcase. The course includes the development of a project proposal, method development, validation, and a final report.

Course Objectives:

Design and validate an analytical method for detecting and quantifying compounds.

Apply the method to real-world samples and analyze the data.

Compare the method's performance with standard methods.

Effectively present the project at the Innovation Showcase.

Learning Outcomes:

Gain expertise in analytical method development and validation.

Develop practical skills in laboratory research and data analysis.

Improve communication skills through written reports and presentations.

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

Group Project and Required Subtasks:

The group project for this course will involve the development and validation of an analytical method for detecting and quantifying a specific compound in a complex matrix. The project will be broken down into the following subtasks:

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

2. **Literature Review and Method Development (Weeks 4-6):**
   - Conduct a thorough literature review to identify existing methods. Develop a new or improved analytical method, including the selection of instrumentation and conditions.

3. **Method Validation (Weeks 7-10):**
   - Validate the method by testing its accuracy, precision, sensitivity, and specificity. Compare the results with standard methods and make necessary adjustments.

4. **Application and Data Analysis (Weeks 11-12):**
   - Apply the validated method to real-world samples. Analyze the data to quantify the compound of interest and assess the method's reliability.

5. **Final Report and Presentation (Weeks 13-15):**
   - Document the entire method development and validation 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 Method Development: 15 points

Method Validation: 18 points

Application and Data Analysis: 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)