CHEM 506 – Forensic Analytical Chemistry Lab – Fall 2020, 1.0 Credit Hr

Meeting Time/Location: Room 310 Sims Science Building
Sec 001, 002 Course # 12672, 13039

Instructor: Dr. Cliff Calloway (callowayc@winthrop.edu)
312-B Sims Science Building/323-4945 Cell: 803-329-4582
Office Hours: 10:00 – 12:00 MWF {Zoom. Other times and modes, too…please don't hesitate to contact me. I check email and voicemail throughout the day and evening.}

Course Goals:

Forensic chemical analysis frequently involves the application of analytical chemistry techniques to matters of the law. The purpose of this course is to expose students to the various types of instruments and techniques that are likely to be encountered in a forensic analysis laboratory. While the government or private forensic lab **may** be better equipped than our academic one, the basic types of instrumentation will be the same. The instruments we will use this semester are located in various places within Sims Science Building, but most are located in Sims 310, along with sample and standard preparation workspace.

You will work individually for solution preparation and data collection. Collaboration on processing data or reporting is prohibited, except with the instructor. Background references are required reading, and can assist in processing data, introductory, and discussion concepts.

Each lab will have an unknown sample(s) for most projects. Directions for the operation of each instrument (student manuals) are located near each device. You are expected to familiarize yourselves with this manual before you begin the instrumental work. Usually, the instructor will demonstrate the operating procedure prior to your measurements. Feel free to ask questions when they arise.

Each instrument you encounter contains delicate components, even those instruments that appear to be out-dated. Handle them with care. If you believe that a malfunction has occurred, inform the instructor before continuing. You should always consult the instructor before making changes in instrumental parameters other than those described in the student manual and **never** perform an operation you have not been "checked-out" on by the instructor. These instruments are typically quite expensive ($5,000 - $200,000).

The **goal** of this lab course is to give students hands-on experience with the sophisticated instrumentation often encountered in a forensic lab and the unique sampling handling requirements and reporting of forensically relevant samples. A clear understanding of the purpose and limitations of each piece of equipment is necessary. Finally, the ultimate goal of a forensic analysis is the submission of reports to a court of law. Communication, written and expert witness testimony, is a critically important aspect of working in a forensics lab.

University Level Competencies:
Winthrop University's faculty adopted a set of four University Level Competencies (ULCs) to describe the qualities our students develop during their Winthrop career. It is easy to see that this course involves solving problems and developing written communication skills. However, you will also learn the responsibilities of chemists to the greater good of our planet and society, as well as the global nature of the chemistry enterprise. Within the discussions of chemical analysis, instrument design and subsequent applications to the environment, health and materials we use every day, I think you will find this course fits well with all four competencies:

Competency 1: Winthrop graduates think critically and solve problems.

Winthrop University graduates reason logically, evaluate and use evidence, and solve problems. They seek out and assess relevant information from multiple viewpoints to form well-reasoned conclusions. Winthrop graduates consider the full context and consequences of their decisions and continually reexamine their own critical thinking process, including the strengths and weaknesses of their arguments.

Competency 2: Winthrop graduates are personally and socially responsible.

Winthrop University graduates value integrity, perceive moral dimensions, and achieve excellence. They take seriously the perspectives of others, practice ethical reasoning, and reflect on experiences. Winthrop graduates have a sense of responsibility to the broader community and contribute to the greater good.

Competency 3: Winthrop graduates understand the interconnected nature of the world and the time in which they live.

Winthrop University graduates comprehend the historical, social, and global contexts of their disciplines and their lives. They also recognize how their chosen area of study is inextricably linked to other fields. Winthrop graduates collaborate with members of diverse academic, professional, and cultural communities as informed and engaged citizens.

Competency 4: Winthrop graduates communicate effectively.

Winthrop University graduates communicate in a manner appropriate to the subject, occasion, and audience. They create texts - including but not limited to written, oral, and visual presentations - that convey content effectively. Mindful of their voice and the impact of their communication, Winthrop graduates successfully express and exchange ideas.

Student Learning Outcomes:

- Gain hands-on experience with forensic sample handling and preparation.
- Use sophisticated laboratory instrumentation for the analysis of forensic samples.
- Perform rigorous data collection and data analysis with the aid of desktop computers.
- Improve technical writing skills through written reports.

Attendance:
You should expect to attend each lab for the full period. If you must miss a lab period, see the instructor as soon as possible. Excused absences for illness are verified through the Student Health Services. Non-illnesses are verified through Student Affairs. Sports commitments are validated by Athletics. Make up labs will be scheduled only in special circumstances.

Course Requirements and Grading:

Text(s): ***Winthrop University Forensic Analytical Chemistry Lab Manual***

Pre-requisite: CHEM 314 (Quantitative Analysis Lab)

Co-requisite: CHEM 505 (Forensic Analytical Chemistry)

There will be a total of **eight lab assignments** valued at **50 pt each**, a **case study (50 pt)**, and a **comprehensive lab final exam** valued at **50 pt** (distributed the last week of lab, due Wednesday, December 9th). An assignment generally consists of (1) a lab **report** grade, (2) a lab **notebook** grade, and (3) a lab **quiz** grade.

- **Notebook:** At the beginning of a project, each student must submit, for approval, a written experimental plan. The plan should be in the **notebook** and include a detailed scheme for the preparation of solutions and for carrying out the task of the lab assignment. Notebooks will NOT be collected. **(10 pt)**
- **Report:** The report will consist of: Title Page, Introduction, Procedure, Sample Calculations, Results, Conclusion, Discussion, and Reference sections. See Laboratory Report below for further details. **(30 pt)**
- **Quiz:** A written 10-15 minute quiz will be given at the beginning of the laboratory period covering the previous project. See Laboratory Quiz below for further details. **(10 pt)**

Letter Grades:
As you have probably calculated, a total of 500 points are possible. Your lowest project will be dropped. Letter grades will be assigned based on the percentage of 450 points as follows:

94-100%: A	90-93%: A-	86-89%: B+	82-85%: B
78-81%: B-	74-77%: C+	70-73%: C	66-69%: C-
62-65%: D+	58-61%: D	55-57%: D-	

Required Materials (for lab each week):

- Experiment handouts
- Laboratory notebook, a simple composition book is recommended, fixed pages.
- Safety goggles or glasses
- A scientific calculator that performs least squares analysis, mean and standard deviation.
- Lab Coat (available in the lab)

Lab Access (COVID): The lab is set to accommodate 3 students + instructor at one time. Three round-robin experiments will be set up each week, so that students will be doing different lab projects. The lab will be open during the week for 10 periods, Monday – Friday, 9-12 am and 2-5 pm. You may pick any time slot to complete the lab work that best fits your schedule that week. You may change times, week-to-week, as you need. Send your instructor an email to reserve a time slot each week. Disposable masks should be used during lab to avoid contamination.

Important Notes:

- Again, lab reports are to be your own work, *no group effort*, and are covered by the **Student Conduct Code**: "Responsibility for good conduct rests with the students as individuals." Refer to the *Academic Misconduct Policy* in the online Student Handbook: https://www.winthrop.edu/studentconduct/winthrop-university-student-handbook.aspx
- **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, as early as possible to discuss your concerns.
- All laboratory work (including reports) must be completed to receive a passing grade. The absolute **deadline** for submission of written work is Study Day, 5:00 pm.
- **Handwritten** (rather than typed) reports will not be accepted. These will be returned and late points assessed. The late report policy is strictly enforced, 3 pts/day.
- Remember that the lab experiment is a learning experience. Do not get overly upset if your results do not seem to come out as planned. Try to determine the source of error and comment in your **Conclusion** section.
- All students must be present when the lab period officially begins, when reports and notebooks are collected and quizzes given.
- **Syllabus Change**: While unlikely, the Professor reserves the right to change the course syllabus if circumstances (weather or other events) dictate. You will be notified of any change through lab meetings and/or email.
- **Graduate Level Credit**: Students wishing to receive graduate level credit for this course are required to complete a 5-7 page review paper on a cutting edge analytical technique. Resources for choosing a topic can be found by reviewing either the "Fundamentals Review" or "Applications Review" issues of the journal, *Analytical Chemistry* (June 15th issue of even & odd years, respectively). The topic requires instructor approval. The paper must cite a minimum of 10 primary literature sources and must be submitted by Study Day. Graduate students should be aware that Winthrop's +/- grading system is not applicable to courses taken for graduate credit. Letter grades will be assigned as follows: 92%-100% A; 83%-91% B; 74%-82% C, 55%-73% D.
- **Masking:** Winthrop requires that all students adhere to safety practices that will minimize the transmission of COVID-19 within the campus community. Accordingly, students are expected to engage in social distancing and wear a cloth face mask while on campus. Failure to comply with this requirement in the classroom will result in dismissal from the current class meeting. Repeated violations will be reported to the Dean of Students as a violation of the Student Conduct Code. Students with conditions that prohibit the wearing of a face mask should discuss this with their instructor and/or contact the Office of Accessibility to arrange appropriate accommodations.