CHEM 220L – FUNDAMENTALS OF ANALYTICAL CHEMISTRY LAB (FALL 2020)

*This syllabus is subject to change due to the fluid nature of the semester. Any changes will be announced via email, OAKS, and Zoom.*

Section and Instructor:

SECTION 01: MON, 1:30 – 7:30 PM
Dr. Katherine M. Mullaugh (she/her)
Phone: 843-953-6587
Email: mullaughkm@cofc.edu

SECTION 02: TUES, 2:00 - 8:00 PM
Dr. Jay G. Forsythe (he/him)
Phone: 843-953-5052
Email: forsythejg@cofc.edu

Location: SSMB 323 and/or online.

Online Office Hours: Email your instructor to set up a meeting as needed. Office hours will be held over Zoom.

Co-requisite: CHEM 220  Pre-requisites: CHEM 112, 112L, MATH 111 (or equivalents)

Course Description:
Analytical Chemistry Lab (also called Quantitative Analysis Lab) is your opportunity to learn and perfect laboratory skills that will serve as the foundation for techniques you will use in upper-level laboratory experiences and research. This quantitative lab course complements the CHEM 220 lecture, which is a co-requisite for this course. You cannot drop one course without dropping the other. At every lab meeting, you will need the required materials listed below and must arrive wearing proper attire and personal protective equipment (PPE).

Required Materials: (subject to change)
1) Safety glasses or goggles
2) Lab coat
3) Nitrile gloves (not latex)
4) Mask which fully covers nose and mouth
5) Computer with internet access and Zoom

Safety:
The health and safety of all persons is of utmost importance. At the time of writing this, the course will be taught in a hybrid manner featuring both in-person (socially distanced) and online meetings. Obviously, this is subject to change. If you have any concerns about your ability to participate either in person or online, please reach out to your instructor.

Please review the departmental Lab Safety Policy (see OAKS and the departmental website). You are responsible for your own safety and the safety of those around you. This responsibility includes reading the procedures before arriving in the lab to identify and anticipate safety hazards as well as speaking up if you observe someone doing something unsafe. If you do not wear appropriate PPE, then you will not be permitted to work in the lab. Please note:
1) Safety glasses or goggles and face masks are mandatory at all times in the lab;
2) Proper footwear, long pants, long sleeves, and lab coats are required to minimize your skin exposure to chemicals and other hazards; and
3) Nitrile gloves must be worn when handling chemicals.

Inclement Weather, Pandemic, or Substantial Interruption of Instruction:
If in-person classes are suspended, your instructor will announce a detailed plan for a change in modality to ensure the continuity of learning. All students must have access to a computer equipped with a web camera, microphone, and Internet access. Resources are available to provide students with these essential tools.

Student Learning Outcomes:
• Explore quantitative analytical methods such as titrations, pH measurements, spectrophotometry, and chromatography.
• Demonstrate laboratory skills capable of obtaining precise and accurate results including:
  - ways to prevent contamination
  - dispensing a known mass of a substance
  - methods of quantitative transfer
  - sample preparation
  - reading analog and digital devices
• Properly communicate results using calculations and statistical analyses such as estimates of precision (significant figures), estimates of accuracy (confidence intervals), and units (percent by mass, molarity, percent by volume, and parts per million).
• Prepare high-quality plots using Excel to visualize and analyze data.
• Apply proper calibration methods to volumetric and other analytical measurements.
• Assess the credibility of data obtained in the laboratory.
• Keep a good laboratory notebook.
• Apply appropriate methods of safely handling chemicals and performing laboratory procedures, analyze health and safety information from safety data sheets (MSDS or SDS) and chemical labels, and identify chemical safety hazards.

Lab Station and Materials:
Each student will be assigned a laboratory drawer containing glassware and other tools needed to perform the lab exercises. Each student is responsible for the contents of their assigned drawer and for returning all glassware (clean) and tools at the end of each lab period to the appropriate drawer. For labs that may be performed at home, we will be providing you with both consumable and non-consumable supplies needed to complete the experiment. At the end of the semester, we will require all non-consumable materials to be returned.
Laboratory Procedures:
Preparing yourself before class is critical to completing each exercise in a safe and timely manner. By Friday of the week preceding a lab, your instructor will post a lab procedure and/or other materials to be read and/or watched. It is your responsibility to read each procedure and enter all pre-lab work into your electronic lab notebook (OneNote) before the lab period starts.

Lab Notebook:
Your electronic laboratory notebook will be maintained in Microsoft OneNote and should provide a full record of what was performed during the experiment. You can either directly enter information in OneNote or write it down in a composition book and scan it directly into OneNote. All calculations should be shown in the laboratory notebook such that both you and the instructor may follow your logic and see your complete calculations. You must get in the habit of labeling all measurements with proper units and cancelling those units in calculations. Electronic lab notebooks will be checked by your instructor at the end of the scheduled lab period, so be sure to update it as you go. At the end of the semester, your notebook will be graded, so it is to your benefit to be as complete and organized in your record keeping as possible.

Cleanliness in the Lab and/or at Home:
Keeping the lab clean is essential for a safe and productive working environment. For weeks when we are face-to-face in the lab, you are responsible for keeping your own station and glassware clean. You will also be provided with materials to disinfect your workspace and materials that will be used by the next student.

Some weeks will include experiments that can be performed at home. In these instances you should prepare a clear work area for yourself, keeping materials out of reach of pets and children. Any material that needs to be disposed of following an at-home experiment can be discarded in household trash.

Grading Scheme and Scale:

<table>
<thead>
<tr>
<th>Category</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weekly Lab Assignments</td>
<td>60%</td>
</tr>
<tr>
<td>Safety and Participation</td>
<td>20%</td>
</tr>
<tr>
<td>Lab Notebook</td>
<td>10%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>10%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Letter</th>
<th>%</th>
<th>Grade Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>93 – 100</td>
<td>4.0</td>
</tr>
<tr>
<td>A-</td>
<td>90 – 92</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>87 – 89</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>83 – 86</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>80 – 82</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>77 – 79</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>73 – 76</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td>70 – 72</td>
<td>1.7</td>
</tr>
<tr>
<td>D+</td>
<td>67 – 69</td>
<td>1.3</td>
</tr>
<tr>
<td>D</td>
<td>63 – 66</td>
<td>1.0</td>
</tr>
<tr>
<td>D-</td>
<td>60 – 62</td>
<td>0.7</td>
</tr>
<tr>
<td>F</td>
<td>&lt; 60</td>
<td>0.0</td>
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**Final Exam:** The final exam will be an online test administered the week following Thanksgiving. More details will be provided at a later date.

**OAKS:** OAKS, including Gradebook, will be used for this course throughout the semester to provide the syllabus and class materials and grades for each assignment, which will be regularly posted.

**Course Attendance:**
Consistent with the Cougar Pledge, students who exhibit any symptoms, test positive for COVID, or who may have been in contact with someone who has exhibited symptoms or tested positive, **should not** attend in-person class. If this situation occurs, please inform your instructor and Student Health Services. You will be able to drop the lowest lab grade at the end of the semester. If you must miss more than one lab, your instructor will work with you on a case by case basis.

**Accommodations for Students with Disabilities:**
Any student eligible for and needing accommodations because of a disability is requested to speak with the professor during the first two weeks of class or as soon as the student has been approved for services so that reasonable accommodations can be arranged. Center for Disability Services/SNAP.

**Academic and Scientific Integrity:**
Each student is expected to observe the College of Charleston Policy on Scientific Integrity (available in the Lab Manual and on the departmental website). For this course, please be cognizant of how honesty and scientific integrity apply to the specific actions of working individually to perform the experimental procedure and calculations, accurately recording data in your lab notebook as the primary record and completing your results sheets. Although you will be working through some experiments in groups, post-lab assignments must be completed on an individual basis. Copying work from another student will be considered academic dishonesty.

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when suspected, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines the student’s actions are related more to misunderstanding and confusion will be handled by the instructor. The instructor designs an intervention or assigns a grade reduction to help prevent the student from repeating the error. The response is recorded on a form and signed both by the instructor and the student. It is forwarded to the Office of the Dean of Students and placed in the student’s file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XXF in the course, indicating failure of the course due to academic dishonesty. This status indicator will appear on the student’s transcript.
for two years after which the student may petition for the XX to be expunged. The F is permanent.

Students can find the complete Honor Code and all related processes in the Student Handbook at: http://deanofstudents.cofc.edu/honor-system/studenthandbook/.