CHEM 112L-04 – Principles of Chemistry Lab II – Fall 2021

Wednesdays 1:00–4:00 PM, "in person over Zoom" ONLINE

Instructor Contact Information:
Dr. Jennifer Fox
If you have a question that can be answered over email, please email me at FOXJL@cofc.edu, and I will reply within 48 h. I am also happy to help you with the material in individual or group office hours. Email me with your availability, and we will schedule an appointment over Zoom.

Course Description:
A laboratory course designed to introduce students to the application of the scientific method in solving chemical problems and to acquaint them with specific tools and techniques used in the chemistry laboratory, while reinforcing and illustrating concepts encountered in lecture. CHEM 112L is 1 credit hour.

We will work on a semester-long research project in which we will investigate the degradation of cetirizine (brand name Zyrtec as well as generic forms) in pills stored under extreme conditions (high heat and humidity). Lab techniques we will learn and use in our research include UV-Vis spectrophotometry, pH measurement, and high-performance liquid chromatography (HPLC). Preparation of a buffer and quantitative solutions will be a part of the research project, as well as the use of a sonicator and centrifuge.

Pre- or Co-requisite Courses:
CHEM 111, CHEM 111L, and MATH 111 (or appropriate Math Placement Exam score) are pre-requisites. CHEM 112 is a co-requisite. If you withdraw from either CHEM 112 or CHEM 112L, you will need to withdraw from both classes unless you have made special arrangements with the Chemistry Department (email the department chair, Dr. Jim Deavor, at deavorj@cofc.edu).

Learning Objectives:
Student Learning Outcomes:
1. Practice scientific method in a chemistry laboratory setting
2. Perform the following techniques in a laboratory setting: pipetting, preparing solutions in volumetric flasks, sonication, centrifugation
3. Prepare solutions of a tablet sample, headache powder, and standard material in the laboratory
4. Employ mathematical manipulations using acquired data
5. Interpret scientific data

General Education Student Learning Outcomes:
1. Apply physical/natural principles to analyze and solve problems.
2. Develop an understanding of the impact that science has on society.

These outcomes will be assessed in the final lab report and an assessment assignment. This assignment will account for 20% of the total course grade.

This syllabus is subject to change by the instructor at any time.
Important Dates:
The add/drop deadline is Monday, August 30.
The deadline to withdraw is Friday, October 29.

Required Materials:
1. Lab notebook like a "composition notebook" with sewn-in pages that are not perforated or spiral bound.
2. Scientific calculator (e.g., TI-30Xa scientific calculator, approx. $10) that can handle scientific notation, log, antilog, exponents, and square roots. A graphing calculator is also acceptable.
3. Ballpoint pen with black or blue ink.
4. Computer with internet access. We will be using Zoom Breakout Rooms every week in class. Since Chromebooks and Chrome OS users cannot participate in Breakout Rooms, please use another method to join our class (i.e., please use a desktop or laptop computer). Your computer should meet CofC's requirements. You will need to install the following software (free to you): Word, Excel, and ChemBioDraw.
5. Webcam
6. Microphone (You can use headphones/ear buds with a built-in mic)
7. Phone with AdobeScan app

Class Format:
1. We will meet over Zoom during our class instead of meeting in a laboratory.
2. It should go without saying that you should be equally as respectful of me and your classmates as you would be in a physical classroom setting.
3. Sign into your licensed CofC Zoom account when you join the class Zoom meetings.
   - The Zoom link (or meeting ID and password) for all class meetings is found in the Announcements area of our OAKS page.
   - Please use your first and last name as your display name.
4. Unmute yourself to participate then mute yourself when you are done speaking so that your mic does not pick up background noise that makes it hard for others to hear.

Attendance Policy:
Labs are experiential learning courses that emphasize the scientific method and data interpretation, and they provide training in essential technical skills for chemists and other scientists. Furthermore, the technical lab skills presented in one course are assumed to have been mastered in subsequent chemistry courses. Thus, attendance in all lab periods is mandatory. If you miss a lab meeting due to illness or other emergency, please notify me by email ASAP so that alternative arrangements can be made for you. To receive credit for that week's lab, you will need to make up all work and complete all assignments within the allowed time. If you miss more than two labs, you will receive zeros for assignments due on the days of any further absences, and you must talk with your instructor about whether you can remain in the class or need to withdraw.
Learning Assessment:

1. **Lab notebook**: Each week, the procedure for the experiment to be performed should be written into your lab notebook before lab begins. You may wish to also include drawings of the experimental setup and procedure. (You do not need to write specific instructions for using equipment like the pH meter or SpectraSuite software.) A laboratory notebook should provide a full record of what was performed during the experiment. Most importantly, all data must be recorded in your lab notebook as soon as they are generated. All calculations should be shown in the lab notebook such that the instructor may follow your logic and check for calculation errors. Each student is expected to observe the College of Charleston Policy on Scientific Integrity (found in your lab manual) and the College of Charleston Honor Code found in the Student Handbook.

Each week, you will be submitting your lab notebook entry for that week's experiment to be graded. Use AdobeScan (https://acrobat.adobe.com/us/en/mobile/scanner-app.html) to compile pictures of all your written work (in order) into a single PDF document, and submit it to the appropriate location in OAKS. Before submitting, you should review the file to make sure all pages are present in the right order, correctly oriented, and legible; re-take scans in different lighting if necessary.

2. **Quizzes**: You should take the weekly quiz (in OAKS Content) after you have completed all the preparation for the next week of lab, which will include writing the procedure in your notebook annotated with notes you take from the videos. You may consult your notes while taking the quiz, so it is to your benefit to take good notes. Quizzes are timed, so make sure you are well prepared before starting them. All quizzes are cumulative. They will ask you about the procedures you have just learned in preparation for the next lab, and they will also ask you about concepts you have spent the previous lab meetings learning in more depth.

3. **Participation**: To earn credit for class participation each week, you should both volunteer answers to questions during our class discussions and work collaboratively with your group in breakout rooms. **When in breakout rooms, you must turn your camera on to facilitate interaction with your lab group.** Choosing not to do so will affect your participation grade. You may also want to turn your camera on during our class discussions.

4. **Assignments**: Each week you will have assignments due, some before lab begins and some at the end of lab. These will include report sheets and other data and results (graphs, etc.) along with writing assignments and reviews of your classmates' writing. All assignments will be listed (with due dates) in the weekly module in OAKS Content, and a summary of the schedule for these assignments is at the end of this syllabus. **No late work will be accepted** except you have a one-time 24-hour grace period to cover unforeseen circumstances (loss of internet, car trouble, urgently needing to take a pet to the vet, etc.) that cause you to turn in the assignment late. As mentioned in the attendance policy, if you have an emergency that prevents you from attending class and/or turning in work, email your instructor.
5. **Final lab report:** Your final project in lieu of a final exam will be a lab report describing the research conducted on cetirizine pills. You will build your lab report on our research project throughout the semester, so you will have multiple opportunities to receive feedback as you turn in sections of the lab report. Each of these drafts is graded (as an assignment), but they do not count as much as your final lab report. Your final lab report should incorporate all the feedback you have received and be like a polished, scientific paper communicating the background information, goals, methods, results, and conclusions of your research project to the scientific community.

**Turnitin Software:**
All written assignments will be submitted to OAKS and analyzed by Turnitin to detect plagiarism (refer to the Honor Code and Academic Integrity statement below about the repercussions of plagiarism; minimally, your paper will receive a zero). Turnitin has the authority to "use such papers, as well as feedback and results, for the limited purpose of a) providing the Services, and b) for improving the quality of the services generally. If you have any questions, please refer to the End User Agreement found at [https://turnitin.com/agreement.asp](https://turnitin.com/agreement.asp)."

**Grading Policy and Scale:**

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>XXF (XF)</th>
<th>F</th>
<th>D</th>
<th>C-</th>
<th>C</th>
<th>C+</th>
<th>B-</th>
<th>B</th>
<th>B+</th>
<th>A-</th>
<th>A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Numerical Grade</td>
<td>Failure due to dishonesty</td>
<td>Below 70</td>
<td>70</td>
<td>71-72</td>
<td>73-74</td>
<td>75-79</td>
<td>80-82</td>
<td>83-86</td>
<td>87-89</td>
<td>90-92</td>
<td>93-100</td>
</tr>
</tbody>
</table>

**OAKS Course Site:**
1. You should check both your CofC email address and the OAKS course site regularly. You will be using the OAKS site multiple times per week, as described below.
2. **Course Home: Announcements** – Messages about the course will be posted here.
3. **Content** – Everything you need to do in this class will be organized under Content for the 12 weeks of lab meetings. For assignments due before lab each week (reading the appropriate section of the lab manual, watching the lab video, taking quizzes, and submitting assignments), you will have the flexibility to do these things when it best fits your schedule, with a weekly due date at the beginning of lab each week. Assignments due at the end of lab each week such as report sheets, Excel files, peer reviews, and lab notebook scans should be submitted before you leave lab or very shortly afterwards. Due dates/times for all assignments are listed in Content.
4. **Grades: Assignments** – Feedback on writing assignments will be here.
5. **Grades: Grades** – All your grades will be recorded here.
COVID-19 Reminders:

Respect for Others
For the health and safety of yourself and those around you, you are required to wear a face-covering over both your nose and mouth while inside all campus buildings (you should do the same inside other public buildings). This mask should fit well; there should not be gaps anywhere between your face and the mask. Also remember that students, faculty, and staff should not come to campus when they feel unwell.

Close Contacts and Infection
Anyone with known contact with someone who is infected with COVID is required to follow CDC and CofC guidance, which states that unvaccinated people quarantine themselves away from others for 10-14 days after the last known contact and additionally get tested (negative test results do not eliminate the need to quarantine), while vaccinated people monitor themselves for symptoms and, if they become symptomatic, begin quarantine and testing. Additionally, per the CDC, fully vaccinated people should get tested 3-5 days after their exposure, even if they don’t have symptoms, and wear a mask indoors in public for 14 days following exposure or until receiving a negative test result.

Students living in the same household as someone infected with COVID will need to consult Student Health on the length of their quarantine. If a new member of the household becomes sick, they will need to restart their quarantine.

Anyone who is sick should be tested for COVID and, upon receiving a positive test result, isolate from others for at least 10 days, regardless of vaccination status. Consult Student Health for whether you can come out of isolation after 10 days.

The CDC’s guidance has changed over the course of the pandemic as new data and new variants have emerged; check the latest info for yourself: https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/quarantine.html and find CofC’s info here: https://cofc.edu/back-on-the-bricks/ The easiest thing to do is to contact Student Health about your particular situation to get their guidance: https://studenthealth.cofc.edu/ If you cannot attend class due to a COVID-related situation, contact your instructors for help in making up assignments.

Online Classes Only
It is safe for you to attend online classes from home during both quarantine and isolation. If you are very ill or hospitalized and cannot attend online classes, notify your instructors for help in making up assignments.

Resources
CofC Student Health requests that you inform them of positive COVID testing results and any close contact with someone who is COVID-positive, so they can monitor the campus health situation and give you personalized healthcare. CofC holds regular free testing events on campus for anyone in the campus community to get tested for COVID infection. CofC also holds free vaccination events on campus for all students. Vaccination remains the best way to protect yourself, your family, and those around you.
How to Succeed in this Course:
1. Be an active learner. Participate in class. You will get more out of it, and it will be more fun.
2. Come to class prepared. Every week, you will need to prepare by doing things like reading the procedure and watching the lab video ahead of time. Take good notes in your lab notebook, especially about experimental procedure details, from both the written procedure and the video, and that will help you do well on the quizzes and understand what we do in lab.
3. Incorporate feedback. You will have the opportunity to receive a lot of feedback on your lab report throughout the semester. Every time you receive feedback, carefully incorporate all of it and then re-read your lab report critically for content, flow, wording, and typos. If you take advantage of the opportunities to learn from errors and improve your writing, you will be better equipped to do well on the final lab report, which is worth 20% of your grade.

Honor Code and Academic Integrity:
1. It is your responsibility to conform to the College of Charleston Honor Code and Code of Conduct (http://deanofstudents.cofc.edu/policies-and-procedures/honor-code-and-code-of-conduct.php).
2. In this course, collaborative learning is encouraged, but you must perform your own work on all assignments without copying from others or from internet resources.
3. 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 (refer to the link in the middle of this webpage for a PDF of the handbook http://deanofstudents.cofc.edu/honor-system/studenthandbook/).

SNAP (Students Needing Access Parity) and Disability Access:
The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP office located on the first floor of the Lightsey Center, Suite 104 (http://disabilityservices.cofc.edu/). Students approved for accommodations are responsible for notifying me as soon as possible and for contacting me at least one week before accommodation is needed.
Support Resources:
For help with a wide variety of tech issues, including how to use OAKS (http://blogs.cofc.edu/sits/tutorials/oaks_tutorials/) and Zoom (http://blogs.cofc.edu/sits/zoom-video-resources/), visit Student Instructional Technology Services (https://blogs.cofc.edu/sits/) and the library's guide to online learning http://tutorials.library.cofc.edu/tutorial/onlinestudent. Zoom support is at https://support.zoom.us/hc/en-us/articles/206175806. For issues with your CofC accounts, contact ITservicedesk@cofc.edu (843-953-3375). Student health services (https://studenthealth.cofc.edu/), the Counseling Center (http://counseling.cofc.edu), and food and housing assistance (http://studentaffairs.cofc.edu/student-food-housing-insecurity/index.php) are also available. For important CofC information during hurricanes, visit https://continuity.cofc.edu/ and during the pandemic, visit https://cofc.edu/back-on-the-bricks/.
## Chemistry 112L-04 ONLINE Fall 2021 Schedule (as of 8/16/21)

<table>
<thead>
<tr>
<th>Week</th>
<th>Lab Date</th>
<th>Experiments</th>
<th>Due at Beginning of Lab</th>
<th>Due at End of Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/25</td>
<td>Syllabus, Intros, OAKS, Lab safety</td>
<td>Zoom readiness, Purchase lab notebook</td>
<td>None</td>
</tr>
<tr>
<td>2</td>
<td>9/1</td>
<td>Project intro; Prepare cetirizine pill samples for storage in environmental chamber</td>
<td>Software, Safety videos/quiz, Read intro material, Read Week 2 protocol, Video 1, Procedure notes</td>
<td>Lab notebook</td>
</tr>
<tr>
<td>3</td>
<td>9/8</td>
<td>How to use Web of Science; Making standard solutions and serial dilutions with quantitative glassware</td>
<td>Read Week 3 protocol, Videos 2a and 2b, Procedure notes, Quiz 2</td>
<td>Report sheet 3, Lab notebook</td>
</tr>
<tr>
<td>4</td>
<td>9/15</td>
<td>Analyzing standard solutions and serial dilutions with UV-Visible Spectrophotometry; Using Excel for Lab Data</td>
<td>Web of Science article summaries, Read Week 4 protocol, Videos 3 and 4, Procedure notes, Quiz 3</td>
<td>Report sheet 4, Lab notebook</td>
</tr>
<tr>
<td>5</td>
<td>9/22</td>
<td>Making a 40 mM phosphate buffer of pH=3.0</td>
<td>Read Week 5 protocol, Video 5, Procedure notes, Quiz 4</td>
<td>Report sheet 5, Lab notebook</td>
</tr>
<tr>
<td>6</td>
<td>9/29</td>
<td>How to write a lab report; How to use ChemBioDraw; HPLC of aspirin, caffeine, and acetaminophen</td>
<td>Read ibuprofen article, Read Week 6 protocol, Video 6, Procedure notes, Quiz 5</td>
<td>Report sheet 6, Lab notebook</td>
</tr>
<tr>
<td>7</td>
<td>10/6</td>
<td>Interpretation of aspirin, caffeine, and acetaminophen HPLC results; Peer review of Introduction and References</td>
<td>Read Week 7 protocol, Procedure notes, Quiz 6, Watch 5 videos, Introduction and References Draft</td>
<td>Report sheet 7, Lab notebook, Peer review</td>
</tr>
<tr>
<td>8</td>
<td>10/13</td>
<td>Preparing exposed and control cetirizine samples for HPLC analysis</td>
<td>Read Week 8 protocol, Video 7, Procedure notes, Quiz 7</td>
<td>Lab notebook</td>
</tr>
<tr>
<td></td>
<td>10/20</td>
<td><strong>NO LAB (Fall Break)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>10/27</td>
<td>Interpretation of cetirizine HPLC data; Peer review of Materials and Methods</td>
<td>Read Week 9 protocol, Video 8, Procedure notes, Quiz 8, Materials and Methods Draft</td>
<td>Report sheet 9, Excel spreadsheet, Lab notebook, Peer review</td>
</tr>
<tr>
<td>10</td>
<td>11/3</td>
<td>Discuss cetirizine data from all sections and discuss impact of inactive ingredients and degradation products, Peer review of Results and Discussion</td>
<td>Read Week 10 protocol, Results and Discussion Draft</td>
<td>Lab notebook, Excel spreadsheet, Peer review</td>
</tr>
<tr>
<td>11</td>
<td>11/10</td>
<td>Future directions of the project</td>
<td>Science-Based Persuasive Essay</td>
<td>N/A</td>
</tr>
<tr>
<td>12</td>
<td>11/17</td>
<td>Peer review of the final drafts; finalize your lab report for grading (worth 20% of your grade)</td>
<td>Lab Report Final Draft</td>
<td>Course evaluation, Peer review</td>
</tr>
<tr>
<td></td>
<td>11/24</td>
<td><strong>NO LAB (Thanksgiving Break)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>12/1</td>
<td><strong>No Meeting. Our class time is the due date for your final lab report</strong></td>
<td>Final Lab Report</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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