



# General Chemistry for Engineering Lab

## CHEM 173-001 Course Syllabus

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**Institute:** Loyola University Chicago Department of Chemistry & Biochemistry

**Date:** 8/28–12/16 Tu at 2:30–5:15 PM. Flanner Hall - Room 016.

**Version:** 8/28/2023. *Changes to this syllabus may be made when deemed appropriate.*

**Course:** CHEM 173-001, General Chemistry for Engineering Lab, 3 Credits.



*Preparing people to lead extraordinary lives.*

<https://sakai.luc.edu/x/XDsXEV>


## Introduction

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| <ul style="list-style-type: none"> <li><input type="checkbox"/> <i>Course Details and Policies</i></li> <li><input type="checkbox"/> <i>Course Materials</i></li> <li><input type="checkbox"/> <i>Laboratory Procedures</i></li> <li><input type="checkbox"/> <i>Class Attendance &amp; Course Coverage</i></li> <li><input type="checkbox"/> <i>Important Deadlines</i></li> <li><input type="checkbox"/> <i>Learning Outcomes for CHEM 173</i></li> <li><input type="checkbox"/> <i>Health, Safety, and Well-Being On-Campus</i></li> <li><input type="checkbox"/> <i>Course Repeat Rule</i></li> <li><input type="checkbox"/> <i>Student Accommodations</i></li> <li><input type="checkbox"/> <i>Academic Integrity</i></li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> <i>Loyola University Absence Policy for Students in Co-Curricular Activities (including ROTC)</i></li> <li><input type="checkbox"/> <i>Accommodations for Religious Reasons</i></li> <li><input type="checkbox"/> <i>Privacy Statement</i></li> <li><input type="checkbox"/> <i>LUC Academic Calendar</i></li> <li><input type="checkbox"/> <i>Course Grading</i></li> <li><input type="checkbox"/> <i>COVID Protocols and Assistance</i></li> <li><input type="checkbox"/> <i>Tentative Schedule of the Course</i></li> </ul> |
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## 1.1 Course Details and Policies


### 1.1.1 Office Hours

We at 9:20–11:20 AM. Office hours are held in Flanner Hall 409.

 **Note** For all other times, one should make an appointment via [email](#), preferably two days in advance.

### 1.1.2 Office Hour Policy

Office Hour (OH) is one of the Resources for Help, available to give students a regular set of times every week to have access to talk to the instructor outside of scheduled classes. For regular OH, just show up! Bring your questions, fully or partially formed, anytime during the times listed. Bring a classmate with you or meet your classmates online to work together, get feedback, and help. All students are encouraged to attend office hours regularly to ask questions or to discuss any issues that arise during the semester. Private conversations can occur by request - just show up!


 **Note** No appointment is needed for regular OHs.

### 1.1.3 Time Zone

This syllabus lists dates/times using Chicago local time (U.S. Central Time Zone).

### 1.1.4 Class Meetings

	Days & Times	Room
CHEM 173-001 Lab	8/28–12/16 Tu at 2:30–5:15 PM	Flanner Hall - Room 016

 **Note** Attendance will be taken in class meetings and will have 5% weight in the overall course grade. Every meeting has 2 points towards attendance category. Missing a class due to an official excuse will have 1 point attendance grade per class meeting, if the instructor is notified before class meetings on these days.

### 1.1.5 Email Policy

I require that our lecture course, CHEM 173-001, is listed in the email subject line. Here is how to do this:

- Reply to one of emails that I sent from [Sakai](#) to the entire class.
- Use Email in [Sakai](#) send to me: Instructor, via Select Recipients, and leave the subject line blank.
- Use your Loyola email and put: **CHEM 173-001** in the subject line, send to [mkahveci@luc.edu](mailto:mkahveci@luc.edu).

In most cases I will be able to respond within 48 hours Monday – Friday when classes are in session. You are encouraged to use office hours to get immediate answers to your questions, and to use your classmates as resources for help.

## 1.2 Course Materials

### 1.2.1 Requirement

Chem 171 should be taken concurrently with or before Chem 173.

You will need one bound laboratory notebook, such as a National-brand composition book sold in Barnes and Noble or Beck's bookstore. You will need laboratory goggles and a lab coat. All of which are available at the bookstore.

### 1.2.2 Other Materials

You will need an inexpensive calculator having logarithmic (base 10 and base e), exponential, and trigonometric functions to do routine mole-mass and volumetric calculations associated with this lab.

Lab manuals will be provided electronically in Sakai:

[Sakai](#) → [Resources](#) → [Lab Manuals](#)

Here are the list of some other resources that will be utilized throughout the semester:

- Computer and mobile device (phone, tablet) for connectivity to online resources.
- Accommodation requests must be discussed with Instructor at least one week before a test.
- Scientific Calculator without memory capacity to store any course related formulas.
- Loyola [Sakai](#) course management site: <https://sakai.luc.edu/portal> and tools integrated into the site (e.g. Panopto, Tests & Quizzes).
- Loyola email. Messages are sent to the entire class via [Sakai](#) linked to your Loyola email account.
- Additional web-based systems will be used for uploading your work and facilitating feedback and evaluation. Registration will be free but required. These may include GradeScope, Flipgrid, and other sites.
- Additional software will be used. Downloads will be free but required. These may include applications that convert photos to pdfs (examples: CamScanner, Scannable, GeniusScan), collaboration materials for group work (examples: JamBoard, OneNote), testing-related software approved by the University (e.g. Respondus Browser), and others.

## 1.3 Learning Outcomes for CHEM 173

- Understand and demonstrate safe laboratory practices.
- Use laboratory generated data to reach sound conclusions about chemical phenomena.

- Learn the proper use of an analytical balance
- Develop good laboratory practices in conducting experiments and reporting experimental results.
- Observe and interpret chemical reactions: color change, temperature change, precipitate formation, and gas evolution
- Learn the proper use of a digital pipet.
- Learn the proper use of volumetric glassware
- Use a calorimeter to measure heat transfer
- Observe and interpret chemical reactions: color change, temperature change, precipitate formation, and gas evolution
- Understand Beer's Law
- How to perform a titration and calculate equilibrium constants from the data.

## 1.4 Laboratory Procedures

Students will work in pairs for labs 3-10. You will be given the lab manuals that are pertinent to each lab assignment beforehand. You will be required to take a pre-lab quiz on Sakai to demonstrate you are prepared for lab. Pre-lecture will be typically embedded in the lecture meetings, while the lab meetings will have a short demonstrations to begin with. We will provide you with handouts before lab and explain the procedures and goals for each assignment prior to its execution. The instructor will explain during the first lab period of the semester how the notebook is to be written. You will be required to construct data sheets to present your data for grading for each of the ten labs. The instructor will explain how this is to be done during the pre-lab lecture.

You will **sign in** for lab when you enter FH 016, and get your TA's signature for your lab notebook and then **sign out**.

## 1.5 Class Attendance & Course Coverage

Attending to the lab meetings are mandatory (also see [Professionalism \(5%\)](#), pp. 7). You will have the chance to introduce yourself to multiple classmates early in the course. Our actual pace may vary from the tentative schedule, [Tentative Schedule of the Course](#) (pp. 12). If you miss a class for any reason, it is your responsibility to work through the content along with the lecture recording/lecture notes once it is posted, and I also suggest you contact a classmate for further discussion of the topics as you are still responsible for all material covered and assigned.

## 1.6 Important Deadlines

- Sunday 9/10/2023: Last day to withdraw without a mark of "W"
- Monday 9/11/2023: Last day to convert from credit to audit or vice versa
- Monday 9/11/2023: Last day to request or cancel pass/no pass option
- Friday 11/3/2023: Last day to withdraw from session without a penalty grade of "WF"; midnight

## 1.7 Lost and Found

Any items mistakenly left in lab will be taken to the Chemistry Department office, Flanner Hall 125, and can be identified and claimed there. **Please put your name on your data sheets, lab manuals, calculators and other personal items.**

## 1.8 Health, Safety, and Well-Being On-Campus

Please be familiar with and adhere to all policies and protocols posted on the Campus Info & Resources site: <https://www.luc.edu/healthsafetyandwellbeing/campusinforesources>.

## 1.9 Course Repeat Rule

Effective with the Fall 2017 semester, students are allowed only **three attempts to pass Chemistry courses with a C– or better grade**. The three attempts include withdrawals (*W*). The Department advises that it is preferable to complete a course with a grade of *C* or *C–*, and to demonstrate growth in future coursework, than to withdraw from a course.

## 1.10 Student Accommodations

The Student Accessibility Center (SAC, formerly known as SSWD), Sullivan Center (773-508-3700), <http://www.luc.edu/sac>, has the mission “to support, service, and empower Loyola University Chicago students with disabilities” and to “Partner with faculty and staff to provide opportunities for collaboration, professional development, personal growth, and staff interaction, as they relate to students with disabilities.” Please direct all questions concerning accommodations of disabilities to the Student Accessibility Center. Academic accommodations afforded to students require documentation and review. The Student Accessibility Center will issue accommodation letters for registered students to present to their instructors: accommodations are not active until students present these letters to their instructors. If students’ accommodations involve attendance or deadlines, instructors and students will jointly complete and execute an Agreement Form articulating their terms. See <https://www.luc.edu/sac/faculty/facilitatingaccommodations> for guidance about implementing various kinds of accommodations in a way that is appropriate to your class. The Student Accessibility Center stands ready to work with you.

## 1.11 Academic Integrity

All students in this course are expected to have read and to abide by the demanding standard of personal honesty, drafted by the College of Arts & Sciences, which can be viewed at:

<https://www.luc.edu/cas/advising/academicintegritystatement>. A basic mission of a university is to search for and to communicate the truth as it is honestly perceived. A genuine learning community cannot exist unless this demanding standard is a fundamental tenet of the intellectual life of the community. Students of Loyola University Chicago are expected to know, to respect, and to practice this standard of personal honesty.

Academic dishonesty can take several forms, including, but not limited to cheating, plagiarism, copying another student's work, and submitting false documents. Any instance of dishonesty (including those detailed on the website provided above or in this syllabus) will be reported to The Chair of The Department of Chemistry & Biochemistry who will decide what the next steps may be. (please specify what the punishments will be for transgressions).

### **Balancing AI Assistance and Personal Understanding in our Academic Journey**

In accordance with the constructivist epistemology of learning, let's ensure that we engage actively in the process of learning and collaboratively share optimal methods. It's important that we do not overly rely on AI to handle the learning on our behalf. Within the framework of this course, it is required that any assignments submitted for evaluation reflect your personal ideas and comprehension of the designated materials.

If you find yourself in a situation where you're unsure whether your utilization of AI aligns with the standards set by the University or the course itself, I encourage you to reach out to me for a discussion regarding your apprehensions. Constructivist learning emphasizes the active role of the learner in constructing knowledge, and this course aims to promote your individual engagement and understanding of the subject matter.

### **1.12 Loyola University Absence Policy for Students in Co-Curricular Activities (including ROTC)**

Students missing classes while representing Loyola University Chicago in an official capacity (e.g., inter-collegiate athletics, debate team, model government organization) shall be allowed by the faculty member of record to make up any assignments and to receive notes or other written information distributed in the missed classes.

Students should discuss with faculty the potential consequences of missing lectures and the ways in which they can be remedied. Students must provide their instructors with proper documentation i.e., "Athletic Competition & Travel Letter" describing the reason for and date of the absence.

This documentation must be signed by an appropriate faculty or staff member and it must be provided to the professor in the first week of a semester. It is the responsibility of the student to make up any assignments. If the student misses an examination, the instructor is required to allow the student to take the examination at another time (See <https://www.luc.edu/athletheadvising/attendance.shtml>).

Students who will miss class for an academic competition or conference must provide proper documentation to their instructor as early in the semester as possible.

### **1.13 Accommodations for Religious Reasons**

If you have observances of religious holidays that will cause you to miss class or otherwise effect your performance in the class you must alert the instructor *within 10 calendar days of the first class meeting of the semester* to request special accommodations, which will be handled on a case by case basis.

## 1.14 Privacy Statement

Assuring privacy among faculty and students engaged in online and face-to-face instructional activities helps promote open and robust conversations and mitigates concerns that comments made within the context of the class will be shared beyond the classroom. As such, recordings of instructional activities occurring in online or face-to-face classes may be used solely for internal class purposes by the faculty member and students registered for the course, and only during the period in which the course is offered. Students will be informed of such recordings by a statement in the syllabus for the course in which they will be recorded. Instructors who wish to make subsequent use of recordings that include student activity may do so only with informed written consent of the students involved or if all student activity is removed from the recording. Recordings including student activity that have been initiated by the instructor may be retained by the instructor only for individual use

## 1.15 LUC Academic Calendar

<https://www.luc.edu/academics/schedules>

## 1.16 Course Grading

The total grade for the course is based on Professionalism, Prelab Quiz, Postlab Quizzes, Lab Notebook, and Worksheets.

### 1.16.1 Professionalism (5%)

Attendance will be taken in class meetings and will have 5% weight in the overall course grade. Every meeting has 2 points towards attendance category. Missing a class due to an official excuse will have 1 point attendance grade per class meeting, if the instructor is notified before class meeting on these days.

#### Definition 1.1 (What is Professionalism?)

*In Merriam-Webster, **professionalism** is defined as “the conduct, aims, or qualities that characterize or mark a profession or a professional person.”<sup>a</sup>*

<sup>a</sup>Professionalism. (2019). In Merriam-Webster.com Dictionary. Retrieved May 27, 2022 from <https://www.merriam-webster.com/dictionary/professionalism>



In the context of CHEM 173-001, professionalism is demonstrated through:

- ① attendance,
- ② punctuality, and
- ③ assignment deadline behavior.

The following excerpt is drawn from a recent study<sup>1</sup> about the effect of professionalism on students' performance in face-to-face, online, and hybrid settings.

<sup>1</sup>Ulmer, JM. (2020). Professionalism in Engineering Technology: A study of final course grades, student professionalism, attendance, and punctuality. *Journal of Technology Education*, v31(2), 56–68. Retrieved May 27, 2022 from <http://files.eric.ed.gov/fulltext/EJ1254763.pdf>

Study results indicate that **professionalism grades, in terms of attendance and punctuality, were high (median of 93.33–100%) for students earning 80–100% median final course grades.** Students earning 70–80% mean final course grades were less motivated to earn high professionalism grades— earning a 75.20% mean. There was little difference between final course grades and professionalism grades for students earning less than a 70% median for a final course grade.

Thus, I expect all of my students to attend the course meetings regularly and stay active during lecture. The following scale will be applied to determine the Professionalism grade for this course:

- Professionalism points: 10 points will be assigned to all students at the beginning of Fall 2023. In response to the potential issues revolving around punctuality and assignment deadline behaviors, –2 points will be applied for each occurrence until the maximum of five occurrences is reached.
- Attendance grade is computed based on being present in class and scaled to 10 points.
- Weighing 5% of overall course grade: 50% is designated to Attendance, and 50% is designated to Professionalism.

**Example 1.1** Let's say one attended 95% of the class meetings and had one time punctuality issue. Thus:

$$\begin{aligned}\text{Professionalism raw score} &= \frac{50 \times \text{Attendance score}}{100} + \frac{50 \times \text{Professionalism score}}{100} \\ &= \frac{50 \times 9.5}{100} + \frac{50 \times 8}{100} \\ &= 4.75 + 4 \\ &= 8.75 \text{ (out of 10 pts.)}\end{aligned}$$

Then, Professionalism category (i.e. 5% weighted) contribution towards overall course grade is computed as follows:

$$\begin{aligned}\text{Professionalism} &= 5 \times \frac{\text{Professionalism raw score}}{10} \\ &= 5 \times \frac{8.75}{10} \\ &= 4.38 \text{ (out of 5 pts. in overall course grade)}\end{aligned}$$

### 1.16.2 Prelab Quizzes (20%)

A prelab quiz will be available online in Sakai and is due before the relevant lab meeting at 2:30 pm. The prelab quiz ensures that you have read the lab manual and are prepared to conduct the experiment in the lab.

**If you miss a prelab quiz, you cannot do its experiment. No late work is accepted.**

### 1.16.3 Postlab Quizzes (20%)

Postlab quizzes will be available online in Sakai and are due before the subsequent class meeting at 2:30 pm. Upon completing an experiment, collecting data, and finalizing data analysis, you will be prepared to take the corresponding postlab quiz. These quizzes are designed to assess a deeper understanding of concepts, data analysis, and experimental errors.

**If you miss a lab, you cannot take its postlab quiz. No late work is accepted.**



### 1.16.4 Policy on Missed Assignments

Skipping a Lab period is highly discouraged. If you happen to miss a lab period with or without an excuse, **you cannot make it up**. Missing a lab does not affect your grade, because the lowest grades for Pre/Postlab Quiz, Lab Notebook, or Worksheet are dropped.

### 1.16.5 Grading Scale

The following scale will be used to determine letter grades.

Category	Lowest Dropped	Weight	Thresholds	Letter Grade
Professionalism	–	5%	100 – 93	A
Prelab Quiz	1	20%	92 – 89	A–
Postlab Quiz	1	20%	88 – 85	B+
Lab Notebook	1	5%	84 – 81	B
Worksheets	1	50%	80 – 77	B–
Total:		100%	76 – 73	C+
			72 – 69	C
			68 – 65	C–
			64 – 60	D
			0 – 59	F

## 1.17 COVID Protocols and Assistance

### 1.17.1 Masking Requirement

You DO NOT need to wear face masks in class unless you feel sick or you prefer otherwise. Here is the quote from the latest university news on this topic:

Effective May 27, University policy will strongly recommend, but no longer require, masks in classrooms or labs on our Chicago campuses. Faculty members, however, may continue to require masks in their classrooms. Please adhere to any specific classroom policy regarding the use of masks in the classroom. Students who are not compliant with specific classroom policies may be subject to discipline including referral to the [Office of Student Conduct & Conflict Resolution \(OSCCR\)](#) for a policy violation.

### 1.17.2 Absence (Lab/Lab Notebook/Worksheet)

You cannot make up a missed Lab period. The primary mechanism for missing a Lab period is the dropped Pre/Postlab Quiz, Lab Notebook, and Worksheet grades (see Grading Scale above).

### 1.17.3 Missing (Pre/Postlab Quizzes)

Pre/Postlab Quizzes are online and they can be completed remotely. The primary mechanism for missing a Pre/Postlab Quiz is the dropped Pre/Postlab Quiz, Lab Notebook, and Worksheet grades (see Grading Scale above).

## 1.18 Appropriate in Class Behavior and use of Electronic Devices

Rude, disruptive behavior (such as viewing computer materials not concerning class subjects, texting or talking on phones...) will not be tolerated. Voice recording but not visual recording is allowed for pre-lab lectures. Cell phones, pagers, wireless PDAs, etc. must be turned off during lab. If your device is activated during lab, you must leave the lab immediately and cannot return for the duration of that lab period.

## 1.19 Safety in the Laboratory

Laboratory Safety is everyone's responsibility. By registering for and participating in this course you agree to abide by the following rules. Failure to follow these rules constitutes grounds for withdrawing the offending student from the lab session and or course at any time.

1. To wear approved safety goggles at all times in the laboratory.
2. To know both the location of and how to use eye washes.
3. Not to wear contacts in the laboratory.
4. To wear appropriate clothing that minimizes potential chemical contact with your skin. Shoes that adequately cover the entire foot are required. Sandals, open-toes shoes, perforated shoes, open-backed shoes are not acceptable. No skin should be exposed on your feet or legs, so clothing that covers and protects your body from the waist down (including your ankles) should be worn. You must be dressed appropriately to perform an experiment, including your lab coat and goggles.
5. To know both the location of and how to use the safety showers.
6. To know both the location of and how to use the fire extinguishers.
7. Not to perform unauthorized and unknown experiments, nor work in the lab without appropriate supervision.
8. Not to take chemicals or equipment out of the laboratory.
9. Not to engage in horseplay or any clowning around that might endanger you or other students.
10. Not to eat, drink, chew gum, or smoke anything in the laboratory at any time. No headsets or cell phones.
11. To keep your lab space clean and tidy.
12. To ask your instructor or TA when in doubt about procedures.

By using common sense and following these rules, it is unlikely that you or your classmates will be involved in or injured in a mishap in the laboratory.

While it is very important that you do your part to prevent an accident from occurring, it is just as important to know what to do if someone is injured. Critical Injuries include: glass in his/her eye(s), serious cuts, severe chemical burns, severe fire burns, seizures. **Immediately call for help using either the lab phone (security number is taped to phone handle) or the emergency phone in the hallway directly outside the laboratory.**

Anyone with chemicals or foreign objects in his/her eye(s) will be escorted to the Wellness Center or to the hospital.

## 1.20 First Aid and Basics

- Minor Cuts: Band-Aids are available. If you bleed through one Band-Aid, another should be applied over the first. If you bleed through two Band-Aids in a few minutes, or if there is any possibility of broken glass in a cut, you will be escorted to the Wellness Center.

- Minor Burns from Fire: If the skin is unbroken, run cool water over the area or submerge in a cool water bath for at least 5 min. Apply a cool, damp towel.
- Chemicals in Eyes: Immediately flush eyes with water at the eye wash. Continue with flush for at least 10 minutes. You will probably need to hold the affected eye(s) open to do this properly.
- Chemicals on Skin: Dust any dry chemical off with a dry towel and then flush with water. Flush any wet chemical from the skin immediately with water at the sink or safety shower. If clothing is affected, remove clothes before rinsing! Continue with rinse for at least 10 minutes.

## 1.21 Fire Hazards

Each lab is equipped with a fire extinguisher, fire blanket, and safety shower, which should be used in a fire emergency.

- Procedure in a case of a fire: Remain calm; alert the instructor and your immediate neighbors. Personal safety, yours and others in the labs, is always the top priority. A small fire in a small container can be suffocated by covering it with a watch glass or inverted beaker. With a somewhat larger fire, you need to decide whether or not you think you can control it with a fire extinguisher.
- Use of a Fire Extinguisher: Located by the doors in both labs; a back-up fire extinguisher is located at the west end of the floor. Maintain an escape position; i.e. stay between the fire and the doorway. Break the plastic ring, pull out the metal ring, release the hose from the bracket, direct the hose at the base of the flames, and press the lever down.


Note: The fire extinguishers are heavy and not particularly easy to direct. These are multipurpose dry chemical extinguishers, safe for anything we use in lab.

## 1.22 Tentative Schedule of the Course

An outline of the topics that will be covered in this course appears on the next page.

TUESDAY	
Aug 29th	1
Check in, Review of Syllabus, Lab Safety orientation, Lab Notebook, Review of Significant Figures.	
Sep 5th	2
Lab 1. Chemistry of Ordinary Materials. Quizzes: Prelab 1.	
12th	3
Lab 2. Calibration of a Digital Pipette Quizzes: Postlab 1, Prelab 2. Lab Notebooks/Worksheets: Lab 1.	
19th	4
Lab 3. Thermochemistry, Determining specific heats of Metals Quizzes: Postlab 2, Prelab 3. Lab Notebooks/Worksheets: Lab 2.	
26th	5
Lab 4. Energy Relationships in Chemical Equations Quizzes: Postlab 3, Prelab 4 Lab Notebooks/Worksheets: Lab 3.	
Oct 3rd	6
Lab 5. Percent Calcium Carbonate in a Mixture Quizzes: Postlab 4, Prelab 5. Lab Notebooks/Worksheets: Lab 4.	
10th	
Mid-Semester Break (No Class)	
17th	7
Make-up	
24th	8
Lab 6. Group 1 Qualitative Analysis of Unknowns Quizzes: Postlab 5, Prelab 6 Lab Notebooks/Worksheets: Lab 5.	
31st	9
Lab 7. Group 3 Qualitative Analysis of Unknowns Quizzes: Postlab 6, Prelab 7 Lab Notebooks/Worksheets: Lab 6.	

TUESDAY	
Nov 7th	<b>10</b>
Lab 8. Spectrophotometric Determination of Aspirin Quizzes: Postlab 7, Prelab 8. Lab Notebooks/Worksheets: Lab 7.	
14th	<b>11</b>
Lab 9. Determination of Acid Dissociation Constant Values for a Diprotic Acid Quizzes: Postlab 8, Prelab 9. Lab Notebooks/Worksheets: Lab 8.	
21st	<b>12</b>
Lab 10. Determination of an Equilibrium constant for the acid dissociation of Bromothymol Blue Quizzes: Postlab 9, Prelab 10. Lab Notebooks/Worksheets: Lab 9.	
28th	<b>13</b>
Make-up Quizzes: Postlab 10. Lab Notebooks/Worksheets: Lab 10.	
Dec 5th	<b>14</b>
Checkouts	

 **Note** Changes to this syllabus may be made when deemed appropriate.