Prerequisite: Successful completion (grade of C or better) of General Chemistry 2 (CHEM 220 or equivalent). Successful completion (grade of C or better) of or concurrent enrollment in Organic Chemistry Lecture 1 (CHEM 234 or equivalent) is also required.


Laboratory Notebook: Bound, numbered, dual-copy notebook.

Safety Glasses or Goggles: Approved eyeware is required for all laboratory work.

Recommended Text: *Organic Chemistry, 9th ed.* by Solomons (or similar text) for background reading.

**General Laboratory Requirements and Guidelines**

**Laboratory Experiments and Reports**

Laboratory experiments, and your interpretation and communication of your data in lab reports are the focus of the course, and will account for the most significant portion (~65%) of your course grade.

**Lab Exams**

Two lab exams will be given in the course. Lab exams will cover concepts, procedures, and interpretation of data relating to the experiments, as well as problems on IR spectroscopy, gas chromatography, and analytical methods. Lab exams may not be made up.

**Lab Quizzes**

In many cases, experiments may also include a lab quiz that reflects background concepts, procedure, and/or interpretation of data. Quizzes may or may not be announced. Quizzes may not be made up. One quiz score will be dropped.
Problem Sets

Problem Sets on infrared spectroscopy (and other topics) will be required.

Seminars

You will be required to attend two science-related seminars presented on the Skyline College campus. There will be some choice (both topic and date/time) in the seminars you may attend for credit. A short synopsis of the information presented will be required. More details on this requirement will be provided in a separate document.

Grading

The final grade will be based upon
(see important note below):

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab Experiments</td>
<td>65%</td>
</tr>
<tr>
<td>Lab Exams/Quizzes</td>
<td>30%</td>
</tr>
<tr>
<td>Problem Sets</td>
<td>5%</td>
</tr>
</tbody>
</table>

Grade assignments will be based on the following scale:

- A = 90.0% – 100%
- B = 80.0% – 89.9%
- C = 70.0% – 79.9%
- D = 60.0% – 69.9%
- F = 0% – 59.9%

IMPORTANT NOTES ON LAB EXPERIMENTS and GRADING:

- **If you fail to complete 2 (or more) experiments, you will NOT receive a passing grade (C or better) in the course, regardless of your course percentage.** Completion of an experiment requires attendance at the lab sessions in which the experiment is performed and submission of a complete lab report for that experiment.

- You must achieve **70.0% or higher average for lab reports** in order to receive a C or better in the course. You must also achieve **65.0% or higher on your combined exam and quiz average** in order to receive a C or better in the course. These requirements are IN ADDITION TO achieving a minimum of 70.0% or higher overall to receive a C.

Safety

- You MUST observe all safety rules at all times.

- **Safety glasses or goggles MUST be worn in the lab at all times.** You will be asked to leave the laboratory if you fail to keep them on. That lab session may NOT be made up.

- Conduct yourself SAFELY in lab! You may be asked to leave a lab session at the instructor’s discretion for failure to follow safety rules. That lab session may NOT be made up.

- Wear appropriate attire for lab work. You will not be allowed to work in the lab if you have open shoes, short pants or skirts, or other inappropriate attire. That lab session may NOT be made up.

- A full safety discussion, including a separate handout, will be presented in lab. Attendance for the discussion is required to begin participation in lab.

Make-up

*Exams and quizzes may NOT be made-up.*

**Lab exercises:** Laboratory make-up is LIMITED and reserved for cases with serious circumstances. If an **unavoidable** conflict exists, speak to the instructor IN ADVANCE to see if a make-up time can be arranged; in some cases, it may not be possible. Lab make-up should take place during the same week as the lab you would miss. If an **emergency** arises, contact the instructor as soon as possible to see if a make-up time can be arranged. You will be allowed to make-up a lab in another section **only if space and materials are available,** and only with the approval of the instructors of both sections and the laboratory supervisor. In some cases, **make-up may not be possible.** Please be aware that once the class has completed a lab, the stockroom properly disposes of any remaining materials and no make-up is then possible.
Late Work

• Lab reports, prelabs, and problem sets are due as indicated by the instructor. Lab reports and all work are due at the beginning of the lab session (1:10 pm) on the date due, or as indicated by the instructor.
• Late work will have a grade penalty. The following policy is subject to change with notice.
  • Late lab reports will be penalized as follows:

<table>
<thead>
<tr>
<th>Late Submission</th>
<th>Deduction (from points earned)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same day or next day by 5 pm</td>
<td>15 %</td>
</tr>
<tr>
<td>Up to 1 week</td>
<td>40 %</td>
</tr>
</tbody>
</table>

• No lab reports will be accepted (or graded) after one week from the due date.
• Prelabs will not receive credit if late, but are required to perform the experiment.
• Problem sets will be penalized 15% if turned in by 5 pm on the next day, or 25% by 5 pm of the 2nd day following the due date. After that, they will not be accepted for credit.

Attendance

• Attendance at the lab section is REQUIRED. Discussions, lab lectures, and other activities held during laboratory sessions are a REQUIRED element of the course. You may not be allowed to perform an experiment if you miss important safety information presented in lab lecture. That experiment may NOT be made up.
• Late arrival to a lab session may prevent you from working during that experiment, as you may miss important demonstrations and safety instructions. That experiment may NOT be made up. If your prelab is incomplete, arrive at lab on time and participate in the safety discussion.
• If your Prelab Assignment for an experiment is incomplete, you should still arrive at lab on time and inform the instructor. You may still be allowed to take quizzes or participate in some elements of the course.
• Attendance at the lab section is REQUIRED. An instructor-initiated drop may be considered for multiple LAB absences as outlined in the student handbook. Additionally, an instructor-initiated drop may be considered for LAB absences at the beginning of the semester to make room for students wishing to add. However, do NOT assume you are dropped if you stop attending. You must follow the appropriate withdrawal procedures and dates to avoid receiving a failing grade for the course.
• You must check out of your lab drawer within two weeks of dropping or withdrawing from the course. Once you are assigned a locker, you must checkout, even if you do no labs. You may check out by arrangement with the lab instructor or stockroom manager. If you remain registered for the course, you must checkout on the checkout date. If you do not properly checkout of your drawer, the stockroom will charge you a $25 checkout fee.

Special Needs

If you have any special needs for accessibility or any other issues, please discuss with me so that appropriate accommodations may be made.

Dropping or Withdrawing from the Course

If you choose to DROP or WITHDRAW from the course, it is your responsibility to follow the appropriate procedures and observe the ending dates for these options. I will not initiate a drop except under circumstances outlined in the laboratory requirements section of the syllabus.
Personal Conduct – Expectations

GENERAL:

• All students are expected to RESPECT themselves, one another, the instructor, the room, and the equipment. In turn, the instructors will respect students and their academic needs and progress.

• REGULAR ATTENDANCE to lecture & laboratory is required. Please be ON TIME to lecture and lab as a courtesy to the instructor and other students. Time lost due to tardiness to lab, or exams cannot be made up. I will make every effort to start and end class on time. Please also make every effort to arrive and be prepared for class to start at the scheduled time.

• SAFETY: All students are expected to abide by the safety rules in the laboratory. These will be discussed in detail in a separate handout. Note that safety glasses or goggles are required at all times in the laboratory.

• Please SILENCE mobile phones and pagers before entering the lab or classroom. Please do not talk on the phone or check or send voice or text messages during class.

ACADEMIC INTEGRITY:

• Each student is expected to turn in only his or her own work, prepared for this course during the current semester (this applies to problem sets, prelabs, lab reports, and all assignments in the course).

• Each student is expected to do her or his own work on quizzes, tests, and exams without assistance from other students or any unauthorized aids (e.g. cheat sheets, calculator programs, etc.).

• Each student is expected to acquire his or her own laboratory data and report that data without alteration.

• Cheating, plagiarism, or academic dishonesty of any kind will not be tolerated in this course.

• Academic dishonesty will have serious consequences. The FIRST offense (and any subsequent offense) may result in any or all of the following:
  ▪ Receive a zero on the item in question.
  ▪ Lowering of the course grade (in addition to the above penalty).
  ▪ Course failure.
  ▪ Report to the Dean of Enrollment Services (maintains a record of all incidents of cheating).

• Under the standards of Academic Sanctions, you may be subject to any or all of the following on the FIRST offense (and any subsequent offense):
  ▪ A warning
  ▪ Temporary exclusion from an activity or class.
  ▪ Censure.
  ▪ Disciplinary Probation.
  ▪ Suspension.
  ▪ Expulsion.

• Please see the Student Handbook (link available on the course website) or Course Catalog for the college's definitions and policies on academic dishonesty and its consequences.

• Additional discussion of academic integrity may take place in lecture or lab.

• If you have questions regarding academic integrity, please ask the instructor.

• I would like to emphasize that I do NOT expect cheating to be a problem in the course. I expect that students will act with honesty and integrity in all of their work for the course.
CHEM 237 – Laboratory Schedule: Experiments & Readings

Experiments, activities, and dates are subject to change.

*Check the course website for the current laboratory schedule.*

<table>
<thead>
<tr>
<th>Date</th>
<th>Laboratory Experiments &amp; Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>W Jan. 20</td>
<td>Welcome • Safety • Enrollment</td>
</tr>
<tr>
<td></td>
<td>Lecture: Safety</td>
</tr>
<tr>
<td></td>
<td>Lab Lecture: Crystallizations</td>
</tr>
<tr>
<td>W Jan. 27</td>
<td>Lab Drawer CHECK-IN</td>
</tr>
<tr>
<td></td>
<td>Lab Lecture: Acetaminophen Synthesis</td>
</tr>
<tr>
<td></td>
<td>Experiment 3C: Crystallization</td>
</tr>
<tr>
<td>W Feb. 3</td>
<td>Lecture: IR Spectroscopy – Part 1</td>
</tr>
<tr>
<td></td>
<td>Experiment 10A: Synthesis of Acetaminophen</td>
</tr>
<tr>
<td>W Feb. 110</td>
<td>Lecture: IR Spectroscopy – Part 2</td>
</tr>
<tr>
<td></td>
<td>Lab Lecture: Separations &amp; Extractions</td>
</tr>
<tr>
<td></td>
<td>Demonstration: IR – Transmission Experiments</td>
</tr>
<tr>
<td></td>
<td>Experiment: IR Knowns &amp; Unknowns (Part A)</td>
</tr>
<tr>
<td>T Feb. 16</td>
<td>Last day to DROP course (No grade).</td>
</tr>
<tr>
<td>W Feb. 17</td>
<td>Lecture: IR Spectroscopy – Part 3</td>
</tr>
<tr>
<td></td>
<td>Experiment 4B: Determination of a Distribution Coefficient</td>
</tr>
<tr>
<td></td>
<td>Experiment (cont.): IR Knowns &amp; Unknowns (Part A)</td>
</tr>
<tr>
<td>W Feb. 24</td>
<td>Lab Lecture: Esterification</td>
</tr>
<tr>
<td></td>
<td>Experiment 4D: Separation of an Unknown Compound from an Acid Impurity</td>
</tr>
<tr>
<td></td>
<td>Experiment 4E: Critical Thinking Activity</td>
</tr>
<tr>
<td>W Mar. 3</td>
<td>Experiment: Synthesis of Isopentyl Acetate</td>
</tr>
<tr>
<td>W Mar. 10</td>
<td>College Meetings – No Classes</td>
</tr>
<tr>
<td>Date</td>
<td>Laboratory Experiments &amp; Activities</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>W Mar. 17</td>
<td><strong>Lab Lecture:</strong> Chromatography&lt;br&gt;<strong>Experiment:</strong> TBA</td>
</tr>
<tr>
<td>W Mar. 24</td>
<td><strong>Experiment:</strong> Chromatography</td>
</tr>
<tr>
<td>W Mar. 31</td>
<td><strong>Lab Test 1</strong>&lt;br&gt;<strong>Lab Lecture:</strong> Distillations&lt;br&gt;<strong>Demonstration &amp; Workshop:</strong> Using CHEMDraw</td>
</tr>
<tr>
<td>W Apr. 7</td>
<td><em>Spring Recess – No Classes</em></td>
</tr>
<tr>
<td>W Apr. 14</td>
<td><strong>Experiment:</strong> Fractional Distillation &amp; Index of Refraction</td>
</tr>
<tr>
<td>W Apr. 21</td>
<td><strong>Lab Lecture:</strong> Substitution &amp; Elimination Reactions&lt;br&gt;<strong>Experiment 14:</strong> Essential Oils from Spices (Steam Distillation)</td>
</tr>
<tr>
<td>W Apr. 28</td>
<td><strong>Experiment 20:</strong> Reactivities of Some Alkyl Halides&lt;br&gt;<strong>Demonstration:</strong> IR – ATR Experiments&lt;br&gt;<strong>Experiment:</strong> IR Knowns &amp; Unknowns (Part B)</td>
</tr>
<tr>
<td>R Apr. 29</td>
<td><em>Last day to WITHDRAW from course (Grade = W)</em></td>
</tr>
<tr>
<td>W May 5</td>
<td><strong>Experiment 25:</strong> Synthesis of 4-Methylcyclohexene</td>
</tr>
<tr>
<td>W May 12</td>
<td><strong>Experiment:</strong> TBA&lt;br&gt;Lab Test Review&lt;br&gt;Lab Drawer CHECK-OUT</td>
</tr>
<tr>
<td>W May 19</td>
<td><strong>Lab Test 2</strong></td>
</tr>
</tbody>
</table>
Laboratory Report Guidelines

PRELABORATORY ASSIGNMENT
Study the experiments and techniques carefully before you come to the lab. This write-up must be completed in your notebook before the beginning of the experiment. Write clearly. Alternatively, you may type the full prelab. However, please still have the title, date, purpose and reactions included in the lab notebook.

Title / Header
Purpose of the Experiment
Brief statement of the experimental goal (usually in 2 or 3 sentences).
The purpose should state the clear purpose or outcome of the experimental work, not the pedagogical purpose.

Net Chemical Reaction(s) (if applicable)
Physical Constants (from literature)
Melting point, boiling point, molecular weight, density, etc.
(values that are relevant and useful for the experiment)

Procedure
Outline – briefly and clearly, in a numbered, step-by-step format – the working methods of the experiment at a detail adequate to perform the experiment without reference to the book or handouts. (Note: The procedure in the Experiment should be completely outlined here; however, the Techniques do not need to summarized at the same level of detail.)

Answers to assigned pre-lab questions
These are assigned questions from the text or a handout.

LABORATORY REPORT
The lab report will include the prelaboratory assignment (signed or graded) and will also include some or all of the following components depending on the experiment. The report should be typed. However, calculations, chemical structures, and diagrams may be done neatly by hand. (We will cover the use of structure drawing programs this semester. Once covered, please use that software to generate chemical structures.)

Data Table, Mole Table (if applicable) & Observations
Record values measured in the laboratory – Record the values as they are measured. Write down any significant observations, including a detailed description of your product. May be used to organize physical constants, data, and results of stoichiometric calculations. You may wish to set this up in your notebook before lab.

Note: Please have me sign your data pages each day, and have me review the final crystals or other products before you properly dispose of them. In the report, please include both the original, signed pages from your notebook, and a typed data section.

Results (usually presented in a table)
Experimental Melting or Boiling Point Range, Actual yield, % yield (including the calculations) and any other necessary or appropriate information.

Discussion (including Error Analysis)
Discuss the theory of the reactions or phenomena studied. Analyze and explain your data and results (and relate to the theories and concepts behind the experiment). Provide an analysis of error, often including yields and melting points. Also answer any provided discussion questions.

Conclusion
Draw conclusions about the identity and purity of your products or identification of unknowns. The conclusion should indicate whether you were successful in carrying out the purpose of the experiment.

Answers to the questions at the end of the experiment
These are assigned questions from the text or a handout.

EVALUATION
In some cases, your experiment score may reflect an evaluation of your performance, results, and proficiency with techniques in the experiment.