

1. Overview of class. This class is about forensic chemistry. Many of you have seen forensic science shows on TV, such as “CSI” and “Bones.” Forensic science deals with using science to solve crimes, and forensic chemistry is the branch which specializes in using chemistry. In this class, you will learn about chemistry, inorganic and organic, and about forensic applications. The laboratories are designed to give you experience with the kinds of analyses forensic chemists would use in a crime lab. However, keep in mind that this is a chemistry class. A necessary precondition to understanding forensic chemistry is understanding chemistry. Thus you will be expected to master the areas of chemistry listed below. We will not explore other areas of forensic science, such as blood analysis, fingerprints, ballistics, or DNA but will concentrate on basic chemistry.

2. Inquiry-based learning. In this class, you will be asking the sort of questions forensic chemists ask, learning to use some of the techniques forensic chemists use, and then answering the questions like forensic chemists would. In class this will involve case studies in the textbook. In lab this will involve investigating a problem each week. You will write reports on the investigations you do in lab, in which you present the questions you asked, how you went about investigating the problem, what conclusions (answers to the questions) you came to, and how you know your conclusions are valid.

3. Learning Goals. The primary learning goals for this class are for you to:

- Gain a working knowledge of chemistry
- Apply that knowledge to understand forensics
- Gain hands-on experience with forensic laboratory techniques
- Use the results of those techniques to answer forensic questions

4. Textbook. “Investigating Chemistry: A Forensic Approach”, 3rd ed., by Matthew E. Johll

5. Materials. You will need:

- (1) A scientific calculator. These are available in the book store, on-line at sites like Amazon, and at stores like Wal-Mart and Office Depot, usually for around \$10. Calculators which can download and/or store information, which can automatically solve equations, or which can be programmed, are not allowed.
- (2) A carbon-copy lab notebook. Available in the book store.
- (3) Safety glasses for lab. Available in the book store, or you can supply your own with my approval.

6. Content goals. You will be expected to acquire understanding of these areas of chemistry:

From Chapter 1:

- Matter
- Atomic symbols and names

From Chapter 2:

- Chemical reactions
- The scientific method
- Making measurements
- The metric system
- Significant figures
- Accuracy and precision
- Density

From Chapter 3:

- Atomic theory
- The structure of the atom
- Isotopes
- Light

From Chapter 4:

- Ionic vs covalent compounds
- Balancing chemical equations
- Moles
- Stoichiometry
- Limiting reagents and percent yield

From Chapter 5:

- Lewis structures
- Resonance
- Shapes of molecules
- Polarity

From Chapter 6:

- Solubility
- Concentrations
- Acids and bases
- pH

From Chapter 7:

- Intermolecular forces
- Colligative properties

From Chapter 8:

- Basic organic chemistry
- Alkanes, alkenes, alkynes
- Isomers
- Functional groups

From Chapter 9:

- Combustion
- Oxidation-reduction
- Thermochemistry

From Chapter 10:

- Gases and gas laws

From Chapter 11:

- Kinetics
- Half-life

From Chapter 12:

- Radioactivity

From Chapter 13:

- Equilibrium

7. Proper Behavior in Class. Class is a learning environment; expected behavior includes:

- Coming to class on time and being attentive in class.
- Not going in and out of class (unless you're sick) – please get a drink or use the restroom before or after class or during the break.
- Not eating or drinking in class.
- Not bringing your cell phone to class.
- Not working on material for another class.
- Participating in class.

Not respecting the learning environment in class can affect your grade and future recommendations.

8. Attendance.

- All students are expected to attend all lecture and laboratory sessions. However, it is recognized that emergencies can arise which may result in absence from class. You should notify me if an absence is due to illness or other emergency. You are responsible for all material covered in lecture if absent.

- Besides missing class, these also count as an absence:
 1. Being late to class TWICE. (This means coming in after I've finished checking the class roster.) If you come in late, it is your responsibility to see me immediately after class to ensure that you are marked as being tardy and not absent. No adjustments will be made at a later time.
 2. Coming to class more than 15 minutes late.
 3. Leaving class early.
 4. Going in and out of class (except at the mid-class break).
 5. Being inattentive in class or working on other assignments in class.
- You are allowed 2 absences in class. If you exceed the 2 absence limit for any reason, by any combination of absences or tardies, you will:
 - (a) Lose 2 points for the next 2 absences (numbers 4 and 5);
 - (b) Lose 3 points for each additional absence (numbers 6 and up).

These points will be deducted from the final course average. Note that there are no "excused" absences.

- Make-up exams are not given, regardless of the reason an exam was missed. If you miss an exam and present me with an acceptable excuse, the grade on the final exam will count in place of the missed exam grade. You must notify me by the day and time of the exam that you will not be present and you must give me the reason for the absence. If the excuse is not considered acceptable, the exam grade will be a zero. In general, illness or an emergency situation are the only acceptable excuses for missing an exam. If you are going to miss an exam for a religious holiday or for a school-related activity, you must make arrangements to take the exam early. Missing an exam also counts as an absence in the course.
- Cell phones are not allowed in class. Should you bring one and it goes off, or should you use it in any way, you will leave the class and be counted absent. If this happens a second time, you may not return to class. Laptop computers may also not be brought to class. If there is a reason you need a computer to assist you in the class, you must make arrangements with me.

9. Problems. For each chapter, there are problems which you should work to help you in understanding the material. These problems are the ones in the chapter and the odd-numbered ones at the end of the chapter. These problems are for your benefit only; they will not be taken up or graded. Since chemistry is a problem-oriented course, and the tests will include problems, it is essential that you become proficient in working problems. You should work problems as you encounter the material. You should also attempt each problem before seeking help from the book, your notes, or the answer. It is not sufficient to be able to follow how a problem is worked; on a test, you will have to

work a problem all the way through, and the only way you will be able to do this is if you have worked numerous practice problems.

10. Group Assignments.

The class will be divided into groups of 3. Each group will work together on problem sets, case studies, and certain lab experiments.

- (a) Problem sets, which will be collected and graded, will be assigned on most chapters from the even-numbered problems at the end. You will work on these assignments in groups of three students. Each group will hand in one copy of their solutions that has been signed by all group members, indicating that it is the work of all three group members. The work must be shown (not just the answer) and it must be legible and clear. You must write on one side of the paper and staple each problem set. These problem sets are due at the beginning of class time on the due date. Late problem sets will not be accepted. Solutions to these problem sets will be posted on our LearnLink conference after the problem sets have been handed in. Since you are being graded on these problem sets, the Honor Code applies – you may not give or receive help from anyone not in your group; you may not use any material other than your textbook, your study guide, and your notes; and you may not use the Internet in any way.

Each member of a group will receive up to 5 points for each correct problem in a problem set (for some multi-part problems, this means 5 points for each part; for others, the entire problem will be worth 5 points). The problem set grade will be your group's total points for the semester divided by the total points possible.

Signing your name to a problem set for which you did not participate in working is an Honor Code violation. If one member of your group is not participating in working the assigned problems, I expect the other members to let me know.

- (b) Case studies. At the beginning of each chapter in the book, a case study is presented, and at the end of the chapter the forensic results of that case study are discussed. One of these case studies will be assigned to each student group. At the beginning of a chapter, that group will briefly present to the class the questions that case studies poses. When the class finishes that chapter, that group will be responsible for leading a short discussion of that case study, including how the questions were answered.

11. Tests. There will be 3 exams. Each exam will last 75 minutes. For an exam, you may have at your desk only a calculator and pencils; any other material will be given out with the exam. Make sure your calculator is working and that you know how to use it. Calculators will not be loaned or shared. You must take the exam during the scheduled time. If you come in late, you will not be given extra time to finish the exam. The honor code applies to all exams. See the Honor Code section below and the Honor Code handout for more information.

If you finish an exam before the end of the class period, stay at your desk with your test until I am in the room; you may then turn it in to me and leave. Do not leave your test in the room unless I am there to collect it.

Oxford College has adopted as part of its Mission Statement that its curriculum is designed to teach students to "embrace responsible citizenship." In addition, as part of its Purpose Statement, the College lists "to augment the student's ... intellectual awareness of the world". To encourage you to become aware of the world around you, most exams will have a bonus question on "current events."

12. Honor Code. It is assumed that all Oxford College students will adhere to the highest standards of academic honesty and will uphold the Oxford College Honor Code. Accordingly, I do not normally proctor exams.

Note also that the Oxford College Honor Code expects students to report any violations of the Code they know of. See the Honor Code handout for more information.

13. Exam schedule.

Exam I	Thursday, Sept. 27
Exam II	Thursday, Nov. 8 (during lab time)
Exam III	Thursday, Dec. 6 (during lab time)

Exams may be moved forwards or backwards as necessary; this will be announced in class and on the class LearnLink conference. The sections covered for each exam will be announced in class. Depending on the class pace, the exams scheduled for lab time may be moved to that Thursday's class time.

14. Final Exam. There will be a final exam, covering the semester's material. This will be given during the regularly scheduled final exam period.

15. LearnLink. You are expected to read the class LearnLink conference (under Oxford Chemistry) regularly, as well as any subconferences within it and to check your e-mail regularly. (Note: "regularly" means daily M-F). Failure to read a message sent to you or to the class conference is not an acceptable excuse for your action or inaction.

16. Office Hours. My office is Pierce 217. I am usually in my office and available from 9-5 every day. Exceptions are around lunch time (11:30-1:00) and during class and labs.

17. Grading.	Exams (3)	30 %
	Final exam	20 %
	Problem sets	10 %
	Laboratory	30%
	Case studies	10%

If you have taken all 3 exams and your grade on the final exam is higher than your lowest exam grade, the lowest exam grade will be replaced with your final exam grade.

Note – this only applies if you have taken all 3 exams.

18. Grading scale. Grades are normally assigned as follows, without rounding:

93 - 100 A	77 - 79 C+
90 - 92 A-	73 - 76 C
87 - 89 B+	70 - 72 C-
83 - 86 B	67 - 69 D+
80 - 82 B-	63 - 66 D
	below 63 F

Your exam average AND your lab average must both be passing or you will receive a grade of F in the course regardless of your final numerical average. Grades are assigned based on your performance in the course (exams, lab, attendance) and are not open for discussion after being assigned. If you are on a border, consideration is given to attendance, improvement, and class participation.

The laboratory experiments are provided in a separate lab manual.

1. Attendance and participation. You are expected to be present for every lab. If you miss a laboratory and present me with an acceptable excuse, that lab will be excused. You must notify me by the day and time of the laboratory that you will not be present and you must give me the reason for the absence. If the excuse is not considered acceptable, the lab grade will be a zero. It is up to me as the instructor to make the determination as to whether an excuse is acceptable. In general, illness or an emergency situation are the only acceptable excuses for missing an lab. If you miss a second lab, you will receive an F for the entire laboratory component of the course (and note under the course syllabus, this means an F in the course). If you are more than 10 minutes late for lab, you will not be allowed to work and will receive a zero for that lab.

Make sure you come to lab prepared:

- (1) Read the experiment and relevant parts of the textbook and your notes.
- (2) Bring your carbon-copy lab notebook.
- (3) Bring your safety glasses and wear closed-toe shoes.

If it appears students are not coming to lab prepared, prelab quizzes may be introduced.

2. Prelab Meeting. This will precede each experiment. It will begin promptly at the beginning of the lab period, in the classroom listed on the class schedule. It is important that you be on time for this. If you miss the prelab meeting (or a substantial portion of it), you will not be allowed to work in lab that week and will be given a zero for the experiment.

The first week in the prelab meeting, you will see a safety video. If you miss this, you must make arrangements to watch it before working in lab.

3. Proper behavior in lab. You are not allowed to use cell phones in lab or the prelab meeting. Should you bring one and it goes off, or should you use it in any way, you will leave and receive a zero for that experiment. Music players are also not allowed. In the lab itself, all books, book bags, coats, etc., should be left out of the way so nobody trips over them and nothing gets spilled on them. You should remain in the lab until your experiment is finished.

In lab, record all your observations and data into your carbon-copy lab notebook. The notebook is your proof as to what you did. If you were an actual forensic scientist, it could be used as evidence, to back up your testimony, so it is important that everything be recorded as you do it, not copied later. Turn in the carbon copy of your data and observations before leaving lab.

For some experiments, you will work individually; for others, you will work in your group of 3.

4. Safety. The laboratory can be a safe place if you follow the safety rules. If you violate the safety rules, your lab evaluation may be lowered, or you may not be allowed to work in the lab. See the lab manual for the safety rules. The two rules most strictly enforced:

- (1) You must wear your safety glasses at all times in the lab. If you do not bring them with you, you will have to leave lab and get your glasses.
- (2) You must wear closed-toe shoes in the lab. If you come to lab with open-toe shoes, you will have to leave lab and put on proper shoes before returning.

5. Lab reports. For each laboratory you do, you will write up a 1-3 page report. This should include:

- (1) The problem investigated (the question posed);
- (2) What you did (your procedure);
- (3) Why you used the procedure you did;
- (4) What you found (your results);
- (5) What you concluded (and you must support your conclusion).

The write-up for each experiment will give more details about that report.

These reports must be word-processed and printed out. Electronic submissions will not be accepted. Hand-written reports will not be accepted. Part of the grading will be for the writing itself (spelling, grammar, punctuation, and organization), so proof-read and spell-check carefully. You may have someone else read over the report, as long as that person is not in the class. Include copies of any chromatograms, spectra, etc., that you obtained in the lab. Avoid writing in material by hand in the report, unless it is material hard to do using a word processor (such as molecular structures). If more than one page, staple the pages. Make sure your name is on it, along with the experiment number and the date.

Each lab report must be your work and your work alone, even if you worked in a group in lab. (NOTE; this is different from problem sets and case studies, where all members of the group work together.) It is permissible, if you worked in a group in lab, to share the data you collected, but this must be done before any work on the report begins, and the data must be hand copied from another member of your group's lab notebook into your notebook, not shared in a table or other formatted form. Giving or receiving assistance on a lab report is a violation of the Oxford College Honor Code. (See the Honor Code handout.)

Information from any source other than the text book must be cited; this includes the Internet. Failure to do so is a violation of the Oxford College Honor Code.

Experiment 8 is one that requires more work, more independence, and more critical thinking; it will count as two report grades.

- 6. Lateness.** Each report is due Monday by noon. They should be turned in to the appropriate bin outside Pierce 218. Lab reports turned in late will lose 5 points per day late. Turning in a lab report after noon on Monday counts as a day late. If you frequently turn in assignments late, you may see the penalty escalate.
- 7. Evaluation.** As your lab instructor, I will evaluate you on your performance and conduct in lab. This evaluation will count as an additional lab grade; it will be based on such items as being on time, being prepared, following the safety rules, working independently and efficiently, finishing on time, and leaving the lab clean.
- 8. Lab grade.** You will have 10 grades in lab – 9 lab report grades (8 experiments, with Experiment 8 counting as two grades) plus the evaluation. Your lab grade will be the average of these 10 grades.