

Chemistry 451(G)
Applications of Forensic Chemistry
Western Illinois University
Fall Session 2014

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PREREQUISITES: CHEM 332, 341, 370 or 374, or consent of instructor.

SUBJECT MATTER: In-depth applications of physico-chemical principles to analysis of physical evidence from criminal investigations including explosive residues, arson debris, hairs, fibers, glass, paint, papers, inks, and soil. State-of-the-art techniques and instrumentation are used. Cannot be applied toward the Chemistry minor.

COURSE STRUCTURE

This course is composed of lectures, participation activities (in class and at home), and lab experiments. We will meet face-to-face for lecture and lab sessions and will also make extensive use of our Western Online course website (<http://westernonline.wiu.edu>).

If you need technical assistance at any time during the course or to report a problem with Western Online you can:

- Call uTech support center 309-298-2704
- Use Desire2Learn Help 10.1

OBJECTIVES:

1. Gain a fundamental understanding of the types of criminal evidence and the correct procedures for their collection, preservation, inventory and transportation.
2. Understand the principles, theories, and application of the appropriate analytical/biological technologies used for the analysis of forensic evidence.
3. Gain knowledge of how to perform meaningful interpretation of data from analytical/forensic measurements.
4. Gain case-specific practices of linkage between the chemical, forensic, and interpretative (or statistical) domains of the forensic chemistry field.

REQUIRED MATERIALS - NOT OPTIONAL

Suzanne Bell (2006). *Forensic Chemistry*, 2nd edition.

Pearson Prentice Hall Publishers, Upper Saddle River, New Jersey 07458.

Protective Eyewear (safety goggles) for use in the laboratory.

GRADE DETERMINATION:

Component	%	POSSIBLE POINTS
Chapter Problems	20	100
Laboratory Experiments	20	100
Research Paper	15	75
Exam I	10	50
Exam II	10	50
Exam III	10	50
Final Exam	15	75
TOTAL POINTS	100	500

GRADING SCALE	
A	93-100%
A-	90-92%
B+	87-89%
B	83-86%
B-	80-82%
C+	77-79%
C	73-76%
C-	70-72%
D	60-69%
F	0-59%

TO ESTIMATE YOUR GRADE: Add up number of points earned and divide by the number of points possible. Note: the final semester grade will be calculated based on the highest total points earned by a student in this class, which may (or may not) be lower than the total possible points shown here.

1. LABORATORY EXPERIMENTS (20%): A total of 12 lab experiments will be performed during the semester (two labs at a time, on six dedicated lab days). Instruction manuals for each laboratory experiment will be provided via the course website on Western Online. To prepare for the lab, students must read through each lab in advance and complete a pre-lab quiz by 8:00 pm on the day before the lab is conducted. No student will be permitted to begin working in the lab until the quiz has been successfully completed. Students must also print the lab instructions and worksheet and bring them to the lab. Data and post-lab questions from the lab worksheets must be typed up and submitted to the Western Online drop box by 8:00 pm on the Sunday following the lab experiment (see schedule, below). Students will work in lab groups of three or four people, but each student must complete his/her own worksheet and questions. No credit will be given to any student who did not physically complete the lab as instructed (including safety rules and post-lab cleanup).

The following rules must be observed while working in the laboratory:

- 1. Appropriate safety glasses must be worn at all times** – the use of contact lenses is also discouraged, however, if you do plan to wear lenses in the laboratory you must inform your instructor and wear safety goggles.
- 2. Proper dress is required** - bare feet, sandals, or opened-toed shoes are not allowed in the laboratory. It is best not to wear expensive clothing as stains and holes can result from misplaced chemicals.
- 3. Behaving appropriately** – you must be aware of others around you, so be careful when carry chemicals and walk through the laboratory.
- 4. Know the location and operation of the safety equipment** – this includes eyewash facilities, fire extinguishers, fire showers, and fire blankets. In case of fire, do not panic, clear out of the immediate area, and call your instructor for help.
- 5. Cleaning up** – it is important that you clean your workstation upon completing your laboratory exercise.
- 6. Food, drinks and smoking of any kind are not allowed in the laboratory** – keep all objects, such as glassware or plastic tubing, out of your mouth while in the lab.
- 7. No cell phone calls in the laboratory.**

2. CHAPTER PROBLEMS (20%): A set of problems is found at the end of each chapter in the text book. These must be completed and submitted to the Western Online class drop box by 8:00 pm on the Sunday following completion of that book chapter (see schedule, below). There are three types of questions. Questions “From the Chapter” have answers that derive directly from the chapter readings. “Integrative” questions involve problem-solving, and may require a bit of online or other outside research to arrive at a conclusion. “Food for Thought” questions ask you to reflect on related topics and may not have a single correct answer. Students are encouraged to work through the chapter problems in small groups, and may to use scheduled lab time on non-lab days to do so; however, each student must ultimately complete and turn in his/her own answers.

3. RESEARCH PAPER (15%): A 5-10 page research paper will be written a topic of forensic chemistry relevance, which must be chosen in consultation with the instructor. Students are strongly encouraged to start working on these papers early in the semester. The topic and list of (at least five) pertinent journal articles must be submitted for instructor approval by November 2nd. The final version of the term paper is due on December 7th. All assignments are meant to be the original work of the individual student and any facts, figures, or quotations taken from another source must be appropriately cited; **plagiarism is not acceptable and will result in a score of zero**. If the student is not familiar with the concept of plagiarism they should ask their instructor or contact the University Writing Center for clarification.

"The University Writing Center is available to assist you with general and specific questions on writing assigned in any discipline and at any academic level. The one-on-one assistance available at the Writing Center is valuable for generating ideas, talking about global-level issues such as organization, and even working through grammatical problems. The University Writing Center is located in the Malpass Library, third floor, west side. Call for an appointment (298-2815) and be sure to bring a copy of your assignment."

4. EXAMS (45%): Exams are administered via the course website on Western Online. Exam questions are objective--multiple choice or True/False--and will **derive from assigned readings, lectures, and laboratory exercises**. To earn an A grade, one is expected to have learned at least 90% of the total material covered in the course. The exam questions are a representative sample used to assess how much of the entire course material a student has learned, and **do not** represent material that is "more important to know." Therefore, exam questions vary from semester to semester and **will not** be provided in advance. Each exam is cumulative. Students will have 75 minutes to take each midterm and 105 minutes for the final. Makeup exams will only be offered if there is a valid/documented reason for missing the test. **Makeup exams are all handwritten essay/short answer and must be taken during a scheduled time in the instructor's office.**

NOTICE TO STUDENTS WITH DISABILITIES:

In accordance with University policy and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. For the instructor to provide the proper accommodation(s), you must obtain documentation of the need for an accommodation through Disability Resource Center (DRC) and provide it to the instructor. It is imperative that you take the initiative to bring such needs to the instructor's attention, as he/she is not legally permitted to inquire about such particular needs of students. Students who may require special assistance in emergency evacuations (i.e. fire, tornado, etc.) should contact the instructor as to the most appropriate procedures to follow in such an emergency. Contact Disability Resource Center (DRC) at 298-2512 or disability@wiu.edu for additional services.

EMERGENCY PREPAREDNESS:

The WIU Office of Risk Management and Emergency Preparedness provides resources on how to respond to emergency situations. Please view the video resources at www.wiu.edu/rmep (click "Resources" on the right side of the page). If the fire alarms sound and/or students are asked to evacuate the building all students should proceed immediately to the nearest exit and gather at the southwest corner of the Higgins parking lot (near the fence) until the "all clear" is given.

COURSE POLICIES - to earn a passing grade in this course the student must:

1. Complete the readings, laboratory exercises, exams, and research paper as assigned. Your reading assignments for the course are listed below. A considerable amount of material is covered in this course and it is imperative that you keep up with course readings.

2. Participate in a professional manner. Bring a notebook to class and take notes. Listen (*do not have conversations*) while the instructor is speaking. If you have questions, raise your hand and/or politely say "excuse me" to get the instructor's attention. Phrase your questions using professional, respectful words and tone of voice. Turn your cellphone ringer off, and put it away. Your instructor should not be able to see your cell phone at any time during class. Laptops and tablets may only be used with special permission. Use the restroom before class. Leaving the classroom during class should only happen in very rare circumstances of dire emergency. **Failure to follow these rules may result in being required to leave the classroom for the remainder of the class period.**

Email correspondence must also be professional. This means that messages should be written clearly, using proper spelling, punctuation, and grammar. Address the instructor using the appropriate title (i.e., Dr. or Professor). Before sending an email, check to see whether the answer to your question is in the syllabus or other document on Western Online. **Unprofessional messages may not receive a response from the instructor.**

3. Exams are given as scheduled in the syllabus (or announced in class in the unlikely case that Dr. Alveshere must reschedule). **If you miss an exam, you must be able to prove you have a valid reason for missing.** All makeup exams are handwritten - short answer and essay.

4. Study regularly for the exams—do *not* wait until just before! **For a three credit class, it is recommended that students study three to six hours per week, in addition to attending every class period.** For best results, read the assigned chapters before lecture, and then review your notes and the lecture slides (on Western Online) after lecture the same week. If you do this, you will still want to review the study guides before each exam, but you should find that most of the terms and concepts are already very familiar. Attempting to “cram” glossary definitions of the study guide terms will result in poor exam scores.

5. Advice for the readings: Read each chapter with a notebook by your side. Take notes summarizing each section of the chapter, being sure to make note of any terms listed in **bold** in the text. Detailed, insightful notes will make it much easier to review for the exams.

6. Advice for studying for the exams: Begin by reviewing your reading and lecture notes and the lecture slides. Ideally (see above), you will do this at the end of each week to reinforce your understanding of the material while it is still fresh in your memory. Once you have completed these reviews, use the study guide to check that you haven’t missed any major terms or concepts. If you then find an unfamiliar term, review the entire chapter and/or lecture notes/slides in which the topic was covered, to make sure you understand both the term and the context in which it was presented. Utilize office hours throughout the semester, and ask for help if you need it!!

7. Check Western Online to stay apprised of any changes--the student is responsible for keeping up with class. WIU policy on student rights and responsibilities: <http://www.wiu.edu/provost/students.php>.

8. POLICY ON CHEATING, PLAGIARISM, AND OTHER ACADEMIC DISHONESTY:

Each student must complete their own individual course assignments and take their own exams. All exams and the assignments are the responsibility of the individual student. If it can be demonstrated that two students have collaborated in an assignment, they will both lose the opportunity to earn a grade for that assignment. (This does not exclude students from group study). Academic dishonesty in any form, including cheating and plagiarism, will not be tolerated. Potential penalties will be decided on an individual case basis. Please see the WIU Academic Policy for Undergraduate Students for further information: <http://www.wiu.edu/policies/acintegrity.php>

9. LATE ASSIGNMENTS: There is a penalty for turning in a late writing assignment: 5% will be dropped for assignments handed in after class on the due date. 10% will be deducted for each day an assignment is late. **Assignments over 3 days late will not be accepted and will receive a grade of “zero” or F.**

10. POLICY ON INCOMPLETES: to be eligible for an incomplete the student must have completed at least 75% of course assignments (75 % attendance; Exams 1 & 2, writing assignment). Otherwise student will receive an F.

Note: This syllabus reflects the course policies and planned schedule, and may be amended at the instructor’s discretion at any time. Any revisions will be announced in class. The most current version of the syllabus will always be available via the class website on Western Online.

WEEK/DATES		READING ASSIGNMENTS & WEEKLY TOPICS	COMMENTS
1	Aug 26 th and 28 th	Chapter 1 – Introduction <i>Chapter Problems due 8/31</i>	
2	Sep 2 nd and 4 th	Chapter 2 - Metrology Foundations <i>Chapter Problems due 9/7</i>	
3	Sep 9 th and 11 th	Chapter 3 - Quality Assurance and Quality Control Lab: Density of Glass Fragments Lab: Measurements Using a Micropipette <i>Lab Worksheets and Chapter Problems due 9/14</i>	<i>Pre-Lab Quiz due 9/8</i>
4	Sep 16 th and 18 th	Chapter 5 - Chemical Fundamentals: Partitioning, Equilibria, and Acid/Base Chemistry <i>Chapter Problems due 9/21</i>	Exam 1 9/15 - 9/21
5	Sep 23 rd and 25 th	Chapter 6 – Instrumentation (6.1-6.3) Lab: Determination of Ink/Dye by Thin Layer Chromatography Lab: Microscopic Examination of Hair, Textile Fibers, and Paint Chips <i>Lab Worksheets due 9/28</i>	<i>Pre-Lab Quiz due 9/22</i>
6	Sep 30 th and Oct 2 nd	Chapter 6 – Instrumentation (6.4-6.7) <i>Chapter Problems due 10/5</i>	
7	Oct 7 th and 9 th	Chapter 7- Drugs as Physical Evidence Lab: Soil Analysis Lab: Fingerprinting <i>Lab Worksheets and Chapter Problems due 10/12</i>	<i>Pre-Lab Quiz due 10/6</i>
8	Oct 14 th and 16 th	Chapter 8 - Forensic Drug Analysis <i>Chapter Problems Due 10/19</i>	Exam 2 10/13 - 10/19
9	Oct 21 st and 23 rd	Chapter 9 - Drugs in the Body Lab: Identification of Drugs/Poisons by Infrared Spectroscopy Lab: HPLC Analysis of Drugs of Abuse (Part 1) <i>Lab Worksheets and Chapter Problems due 10/26</i>	<i>Pre-Lab Quiz due 10/20</i>
10	Oct 28 th and 30 th	Chapter 11 – The Chemistry and Combustion of Arson <i>Chapter Problems due 11/2</i>	<i>Research Topics/Articles due 11/2</i>
11	Nov 4 th and 6 th	Chapter 12 – Explosives Lab: HPLC Analysis of Drugs of Abuse (Part 2) Lab: Analysis of Explosives in Water <i>Lab Worksheets and Chapter Problems due 11/9</i>	<i>Pre-Lab Quiz due 11/3</i>
12	Nov 11 th and 13 th	Chapter 13 – Firearms and Associated Evidence <i>Chapter Problems due 11/16</i>	Exam 3 11/10-11/16
13	Nov 18 th and 20 th	Chapter 14 – The Chemistry of Color and Colorants Lab: HPLC Analysis of Gunshot Residue Lab: Dyeing Tests for Fibers <i>Lab Worksheets and Chapter Problems due 11/23</i>	<i>Pre-Lab Quiz due 11/17</i>
14	Nov 24-28	<i>Thanksgiving Break</i>	<i>No Classes!</i>
15	Dec 2 nd and 4 th	Chapter 15 – The Chemistry of Polymers <i>Chapter Problems due 12/7</i>	<i>Research Paper due 12/7</i>
16	Dec 8 th and 12 th	Chapter 16 – Forensic Analysis of Inks and Paints <i>Chapter Problems due 12/14</i>	
17	Dec 15-19	Final Exam (Online) Window 8:00 am 12/15 - 8:00 pm 12/17	<i>Final Exam</i>