

Introductory Forensic Chemistry, CH103
Master Syllabus
Department of Chemistry, Washburn University

Recommended: See your instructor for supplementary materials.

Purpose: This liberal arts class entails learning, thinking about, and applying major laws, concepts, and theories of chemistry to issues confronting the practicing criminalist. Because this course may be used to satisfy some of the General Educational Requirements for natural science and mathematics, development of the following three skills will also be emphasized:

- a) Reasoning mathematically and understanding numerical data
- b) Solving problems using the methods of analysis considering evidence, relevance, and validity
- c) processing information both in terms of synthesis and analysis.

Analytical thinking will be stimulated by problem solving activities using the scientific method. The course will also promote synthesis of knowledge gleaned from related learning units and current criminalistic practices. Some mathematical reasoning will be used to understand fundamental principles and their relationship to selected societal issues. Because writing is a wonderful tool for dissecting, synthesizing, learning and expounding on information, the student will have ample opportunities to write essays. Testing will stress problem-solving skills as well as short answer and essay writing skills.

Course material will be covered through a combination of lecture, the Socratic method and discussion. The assigned chapters should be read prior to their coverage in lecture to facilitate understanding of the topic.

Chemistry and general education skills will be learned by various methods including homework, group discussion, demonstrations, quizzes, and examinations. Skill and content acquisition will be assessed; specific questions will evaluate skill development.

The student will demonstrate skill acquisition by:

- 1) showing calculation methods for numerical/mathematical questions
- 2) writing explanations/reasons based on relevant and valid evidence for problem solving questions and
- 3) dissecting, integrating, and relating information content in essay/discussion questions.

All essay discussion questions should be answered in paragraphs containing complete sentences; responses not satisfying this requirement will be downgraded.

Textbook: *Criminalistics*, by James E. Girard, 2007; Student resource web site:

<http://criminalistics.jbpub.com>

Grading:

TWO EXAMS (Final Exam excluded) 100 points each, 200 points total, approximately 40% of the overall grade

There will be NO make-up exams! If you know you will miss an exam, you may make arrangements to take the exam **early**. Missed exams will be recorded as zero points. In the case of a missed exam, the score on the final exam, normalized to 100, will substitute for the missed exam. The first exam will cover Units I and II, Chapters 1 – 3, 5 and 9. The second exam will cover Units III and IV, Chapters 10 - 14.

FOUR HANDS-ON LABORATORY EXPERIMENTS: 25 points each, 100 points total, approximately 20% of the overall grade

There will be NO make-up labs – period.

FINAL EXAM (if necessary – see below): 200 points, approximately 40% of the final grade

Because constant/consistent effort is more valuable than cramming, any student with a cumulative score of **90% or better** will not be required to take the final exam.

HOMEWORK: An opportunity for you to practice problems similar to those you will be expected to understand on quizzes and exams.

MISCELLANEOUS

It is important that you read the textbook and work assigned problems, making an effort to understand them. These problems are for learning and practice purposes.

The student's best interest is served by apprising the instructor of emergencies that prevent class attendance.

If you need help, tutors are available. See the chemistry department secretary or your instructor.

If you need more help than the tutors can provide, see your instructor as soon as possible. Call, e-mail, or ask in person for an appointment.

GRADING SCALE:

A 90-100
B 80-89
C 70-79
D 60-69
F 0-59

A minimum passing grade is 60% of the total points.

Grade calculation = student points/total points x 100

EXTRA CREDIT: A total of no more than **30 points**, of which **15 points** must be perfect attendance.

Do it all at once!! See the instructor for writing projects worth **15 points** extra credit.

Do it a little at a time: Share in class items of current interest (forensic topics, of course).

Share pertinent URLs. Explain why each link is pertinent and worth looking at. **5 points** for each current event or link posted

ATTENDANCE: Attendance is required for lecture and laboratory. If the student is unable to attend, it is the **student's responsibility** to make arrangements with the lecture or laboratory instructor to make up any missed material at the discretion of the instructor.

LABORATORY SAFETY: The following safety rules must be followed to ensure every student's safety. Special safety issues will be discussed for each experiment if necessary. Violation of any safety rules shall be dealt with at the discretion of the instructor or laboratory supervisor.

- Students must view the "Starting with Safety" video before working in the laboratory.
- Students must read, agree to, and sign the "Safety Regulations in the Laboratory" before working in the laboratory.
- In the unlikely even an accident occurs in the laboratory, the student(s) involved with the guidance of the laboratory instructor will submit a completed "Accident Report Form" to the Laboratory Supervisor.
- Students must wear safety goggles at all times in the lab.
- Students must wear shoes in the lab. Open-toed shoes, sandals, or shorts do not offer adequate protection against spilled chemicals or broken glass. Open-toed shoes or sandals are not allowed.
- Eating or drinking is not allowed in the lab.
- Chemicals should not be used for purposes other than those stated in the experiments.
- Wastes must be disposed of properly in accordance with instructions.

CH103 Introductory Forensic Chemistry

Course Outline

Unit I – Introduction to Physical Properties (Chapters 1 – 3 and 5)

Lab: Analysis of glass fragments

A. Conversions

1. Metric / metric conversions
2. Metric / English conversions

B. Physical properties of glass and/or soil

1. Temperature
2. Weight / mass
3. Volume
4. Density
5. Refractive index
6. Gross appearance
7. pH of soil

Unit II - General Inorganic Analysis by Spectroscopy (Chapter 9)

- A. Math concepts
 - 1. Percentage
 - 2. Parts per million / parts per billion
 - 3. Conversions
- B. Atomic structure
 - 1. Electron configuration
 - 2. Lewis electron dot diagrams
- C. Radioactive decay reactions and neutron activation analysis
- D. Basic spectroscopy
 - 1. Emission spectroscopy, ICP and ICP-MS
 - 2. Atomic absorption spectroscopy, AA
 - 3. X-ray analyses

Unit III - Organic Analysis emphasizing Drug Analysis (Chapters 10 – 12)

- Lab: Paper Chromatography of Ink
- A. Organic compounds
 - 1. Lewis electron dot structures
 - 2. Molecular mass
 - 3. Molecular shapes
 - B. Oxidation/Combustion Reactions
 - 1. Balancing chemical equations
 - 2. Covalent bond energy
 - C. Introduction to Chromatography and Mass Spectrometry

Unit IV. Analysis DNA (Chapters 13 and 14)

- Lab: Paper DNA analysis
- A. Drugs
 - 1. Formulas, structures, and molecular weight calculations
 - 2. Analysis of gas chromatograms and mass spectra
 - B. DNA
 - 1. Structure
 - 2. Function
 - 3. Forensic applications
 - i. PCR using STR
 - ii. RFLP
 - iii. Statistical analysis

INSTRUCTOR CONTACT
Office: Stoffer 312B
Telephone: 785-670-2271
e-mail: sue.salem@washburn.edu
Office hours: T, Th by appointment

We here at Washburn University and in the Chemistry Department want you to succeed. If you need extra help, tutors are available. Please see the department secretary or contact your instructor.

UNIVERSITY ADDITIONS – COURSE SYLLABUS

Select Mission of the University:

Washburn University shall prepare qualified individuals for careers, further study and life long learning through excellence in teaching and scholarly work. Washburn University shall make a special effort to help individuals reach their full academic potential.
Washburn University Board of Regents, 1999

Academic Misconduct Policy:

All students are expected to conduct themselves appropriately and ethically in their academic work. Inappropriate and unethical behavior includes (but is not limited to) giving or receiving unauthorized aid on examinations or in the preparation of papers or other assignments, or knowingly misrepresenting the source of academic work. Washburn University's Academic Impropriety Policy describes academically unethical behavior in greater detail and explains the actions that may be taken when such behavior occurs. For guidelines regarding protection of copyright, consult www.washburn.edu/copyright/students. For a complete copy of the Academic Impropriety Policy, contact the office of the Vice President for Academic Affairs, Morgan 262, or go on-line to: www.washburn.edu/admin/fac-handbook/FHSEC7.htm#VIII

Disability Services:

The Student Services Office is responsible for assisting in arranging accommodations and for identifying resources on campus for persons with disabilities. Qualified students with disabilities must register with the office to be eligible for services. The office **MUST** have appropriate documentation on file in order to provide services. Accommodations may include in-class note takers, test readers and/or scribes, adaptive computer technology, brailled materials. Requests for accommodations should be submitted at least two months before services should begin; however, if you need an accommodation this semester, please contact the Student Services Office immediately.

Location: Student Services, Morgan Hall Room 150

Phone: 785-670-1629 or TDD 785-670-1025

E-Mail: student-services@washburn.edu

Students may voluntarily identify themselves to the instructor for a referral to the Student Services Office.

Center for Undergraduate Studies and Programs (CUSP):

As a Washburn student, you may experience difficulty with issues such as studying, personal problems, time management, or choice of major, classes, or employment. The Center for Undergraduate Studies and Programs (Office of Academic Advising ,

Educational Opportunity Program, and Office of Career Counseling, Testing and Assessment) is available to help students either directly through academic advising, mentoring, career counseling, testing and developing learning strategies or by identifying the appropriate University resource. If you feel you need someone with whom to discuss an issue confidentially and free of charge, contact CUSP in Morgan 122, 785-670-1299, advising@washburn.edu.

Withdrawal Policy:

During fall and spring semesters, students may withdraw from full semester courses through the second week of class with no recorded grade. From the third through the eleventh week a “W” is recorded for any dropped course. Beginning with the start of the twelfth week, there are NO withdrawals, and a grade will be assigned for the course. For short-term or summer course deadlines, please check the appropriate Semester/Session Course Bulletin Web Site (www.washburn.edu/schedule)

Official E-Mail Address:

Your Washburn University e-mail address will be the official address used by the University for relaying important messages regarding academic and financial information. It may also be used by your instructors to provide specific course information. E-mail messages sent to your Washburn University e-mail address will be considered your official notification for important information. If you prefer to use an alternate e-mail address to receive official University notices, you can access your MyWashburn e-mail account, choose the "Options" tab, and select "Settings", scroll to the bottom of the screen and enter the e-mail address you would like your Washburn emails forwarded to in the “mail forwarding” area. Click on save changes. This will complete the process of forwarding your Washburn e-mail.