Syracuse University

Course: CHE 113 *Forensic Science*

Credits**:** 4
Meeting Times**:** Monday-Friday 1:32 - 2:18 everyday, 12:41 - 2:18 every other day
Instructor: Paunovic
Email: daniel.paunovic@wcsdny.org

Course Information

Course Description

Chemistry 113, Introduction to Forensic Science, is focused on the application of scientific methods and techniques to crime and law. Recent advances in scientific methods and principles have had an enormous impact on science, law enforcement, and the entire criminal justice system. In this course, scientific methods specifically relevant to crime detection and analysis will be presented. Emphasis is placed upon understanding the science underlying the techniques used in evaluating physical evidence. Topics included are blood analysis, organic and inorganic evidence analysis, fingerprints, hair analysis, DNA, drug chemistry, forensic medicine, forensic anthropology, toxicology, fiber comparisons, soil comparisons, and fire and engineering investigations, among others. This course is intended to provide an introduction to understanding the science behind crime detection. This will be accomplished by providing a rational basis for interpreting the scientific analysis of forensic evidence and through occasional relevant case studies. Laboratory exercises will include techniques commonly employed in forensic investigations.

Learning Goals and Specific Objectives

Scientific methods are radically changing the landscape of our criminal justice system. Increasingly, law enforcement and legal prosecution are reliant upon often complex and detailed scientific analysis of forensic evidence. This course is intended to provide an introduction to understanding the science behind crime detection. This will be accomplished by providing a rational basis for interpreting the scientific analysis of forensic evidence and through occasional relevant case studies. Laboratory exercises will include techniques commonly employed in forensic investigations.

After taking this course, students should be capable or have acquired:

- Understanding the relationships between the law, basic science and applied science

- Describing the role physical evidence and scientific analysis in criminal justice and how the scientific method applies to forensic investigations
- Explaining the basic scientific principles underlying the analysis of biological, chemical, physical and behavioral evidence
- Describing the chemical structure of DNA and how forensic DNA analysis works (e.g., STR, PCR, RFLP, etc.)
- Describing biometrics and how biometric information is used in forensic science
- Describing the aspects and principles of medicine, serology (incl. blood spatter) and toxicology involved in a medicolegal practice
- Elaborating upon the basic concepts underlying modern atomic theory and the basic scientific principles of forensic analytical chemistry and spectroscopy/spectrometry
- Describing the principles of firearm and impression evidence
- Explaining what is meant by the terms forensic psychology and forensic sociology and how these disciplines are employed in forensic science

Grading, Tests, and Assignments

Grading is based on a combination of the criteria that follow, and possibly, additional assignment-specific criteria.

Assignment	Percentage
Exams	50%
Final Exam	25%
Laboratory	20%
In-Class Assignments	5%
	***Total:** 100%*

Percentage	Grade
94-100	A
90-93	A-
87-89	B+
84-86	B
80-83	B-
77-79	C+
74-76	C
70-73	C-
60-69	D

Course Calendar

September				
Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**
			5. Course Intro	**6.** Chapter 1 Notes
9. Bertillon Notes	**10.** *Bertillon Lab*	11. Chapter 1 Notes	**12.** *Truth or Deception Lab*	13. Chapter 1 Notes
16. Chapter 1 Notes	17. Chapter 1 Notes Bertillon Lab Due	**18.** Chapter 1 Notes *Blind Observation Lab*	19. Chapter 3 Notes Truth or Deception Lab Due	**20.** Chapter 3 Notes
23. Chapter 3 Notes	**24.** Chapter 3 Notes	25. Chapter 3 Notes	**26.** Chapter 3 Notes	27. *Chapters 1 & 3 Exam*

October				
Monday	*Tuesday*	*Wednesday*	*Thursday*	*Friday*
30. *Rogue Penny Lab* Chapter 2 Notes	1. Chapter 2 Notes	**2.** *Triangulation Lab*	3. XXXXXXXXXX	4. *Triangulation Lab*
7. Chapter 2 Notes	8. *Crime Scene Processing Lab*	**9.** *Crime Scene Processing Lab*	10. Chapter 2 Notes Triangulation Lab Due	**11.** Chapter 4 Notes
14. XXXXXXXXXX	15. Chapter 4 Notes	**16.** *Measurement Lab* Chapter 4 Notes	17. Chapter 4 Notes	**18.** *Accuracy vs Precision Lab* Chapter 4 Notes

		Crime Scene Processing Lab Due		
21. Chapter 4 Notes	**22.** Chapter 4 Notes	23. *Chapters 2 & 4 Exam*	**24.** DNA Extraction Lab	25. Chapter 5 Notes
28. Chapter 5 Notes	29. Chapter 5 Notes	**30.** *Gel Electrophoresis Lab*	31. Chapter 5 Notes	**1.** *PCR Lab*

November				
Monday	*Tuesday*	*Wednesday*	*Thursday*	*Friday*
4. Chapter 5 Notes	**5.** Chapter 5 Notes	6. *Crime Scene Lab Quarter Final* Gel Electrophoresis Lab Due	**7.** *Crime Scene Lab Quarter Final*	8. *Quarter 1 Final Exam*
11. XXXXXXXXXX	**12.** Chapter 6 Notes	13. *"Is It Human Blood?" Lab*	**14.** Chapter 6 Notes *ABO Blood System Lab*	15. Chapter 6 Notes
18. Chapter 6 Notes *Blood Pattern Analysis Lab*	19. Chapter 9 Notes	**20.** Chapter 9 Notes Sherlock Bones Lab	21. Chapter 9 Notes	**22.** Chapter 9 Notes *Facial Reconstruction Lab*
25. Chapter 9 Notes *Facial Reconstruction Lab*	26. *Chapters 6 & 9 Exam* Sherlock Bones Lab Due	27. XXXXXXXXXX	28. XXXXXXXXXX	29. XXXXXXXXXX

December				
Monday	*Tuesday*	*Wednesday*	*Thursday*	*Friday*

2. Chapter 8 Notes *Facial Reconstruction Lab Due*	3. Chapter 8 Notes	**4.** Chapter 8 Notes	5. Chapter 8 Notes	**6.** *Pig Dissection Lab*
9. *Pig Dissection Lab*	**10.** Chapter 7 Notes	11. Chapter 7 Notes	**12.** Chapter 7 Notes	13. Chapter 7 Notes
16. Chapter 7 Notes	17. Chapter 7 Notes	**18.** Chapter 7 Notes	19. *Chapters 7 & 8 Exam*	**20.** Forensic Games
23. XXXXXXXXXX	24. XXXXXXXXXX	25. XXXXXXXXXX	26. XXXXXXXXXX	27. XXXXXXXXXX
30. XXXXXXXXXX	31. XXXXXXXXXX			

Graded Assessments

- Bertillon Lab - 100 pts.
- Truth or Deception Lab - 50 pts.
- Blind Observation Lab - 50 pts.
- Chapters 1 & 3 Exam - 100 pts.
- Rogue Penny Lab - 100 pts.
- Triangulation Lab - 100 pts.
- Crime Scene Processing Lab - 100 pts.
- Accuracy vs. Precision Lab - 50 pts.
- Gel Electrophoresis Lab - 100 pts.
- PCR Lab - 50 pts.
- Crime Scene Lab Quarter Final - 100 pts.
- Quarter 1 Final Exam - 100 pts.
- ABO Blood System Lab - 50 pts.
- Blood Pattern Analysis Lab - 50 pts.
- Sherlock Bones Lab - 100 pts.
- Facial Reconstruction Lab - 100 pts.
- Pig Dissection Lab - 50 pts.
- Chapters 7 & 8 Exam - 100 pts.

Laboratory

In order to pass CHE 113, a student must have a passing grade in the laboratory portion of the course. Completion of all of the laboratory exercises is expected and required. Students are expected to arrive promptly at the beginning of the lab period and not leave until that particular experiment is completed. Students that arrive too late to complete the experiment in the allotted time and those that arrive on time but depart before the experiment is completed will receive a zero for the experiment.

Course Resources

Required Text

Introduction to Forensic Science: The Science of Criminalistics by James T. Spencer is currently available on Blackboard.

Supplemental Text (optional)

Criminalistics: An Introduction to Forensic Science 13th edition

ISBN: 9780137329816 Criminalistics 13ed, Saferstein and Roy
https://www.pearson.com/en-us/subject-catalog/p/criminalistics-an-introduction-to-forensic-science/P200000001769/9780137542512?utm_source=google&utm_medium=cpc&utm_campaign=dsa_specific_pages&gclid=CjwKCAjwl6OiBhA2EiwAuUwWZfmNvz6Mzfst5Lwb4xWlHLxEJqv36OYy4XRKcCFEwRJl4680p7B_QhoCTKEQAvD_BwE&gclsrc=aw.ds

Students have access to the SU Library resources via their NetID

Syracuse University Policies

Alphabetically listed

Academic Accommodations:

Syracuse University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. There may be aspects of the instruction or design of this course that result in barriers to your inclusion and full participation in this course. Students are invited to meet with the instructor to discuss strategies and/or accommodations in accordance with their individualized education plan.

Academic Integrity

Syracuse University's Academic Integrity Policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The policy governs appropriate citation and use of sources, the integrity of work submitted in exams and

assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same work in more than one class without receiving written authorization in advance from both instructors. Under the policy, students found in violation are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered as described in the Violation and Sanction Classification Rubric. SU students are required to read an online summary of the University's academic integrity expectations and provide a signature agreeing to abide by them. For more information about the policy, see http://class.syr.edu/academic-integrity/policy/.

Related links

Academic Integrity Policy Violation and Sanction Classification Rubric
https://class.syr.edu/wp-content/uploads/2018/08/Academic-Integrity-Policy-Violation-and-Sanction-Classification-Rubric-Updated-081018.pdf

What Students Need to Know about Academic Integrity:
http://class.syr.edu/wp-content/uploads/2018/08/What-Students-Need-to-Know-About-Academic-Integrity-8.6.18.pdf

Artificial Intelligence

As a pre-eminent and inclusive student-focused research institution, Syracuse University considers academic integrity at the forefront of learning, serving as a core value and guiding pillar of education. Syracuse University's Academic Integrity Policy provides students with the necessary guidelines to complete academic work with integrity throughout their studies. Students are required to uphold both course-specific and university-wide academic integrity expectations such as crediting your sources, doing your own work, communicating honestly, and supporting academic integrity. The full Syracuse University Academic Integrity Policy can be found by visiting class.syr/edu, selecting, "Academic Integrity," and "Expectations and Policy."

Upholding Academic Integrity includes the protection of faculty's intellectual property. Students should not upload, distribute, or share instructors' course materials, including presentations, assignments, exams, or other evaluative materials without permission. Using websites that charge fees or require uploading of course material (e.g., Chegg, Course Hero) to obtain exam solutions or assignments completed by others, which are then presented as your own violates academic integrity expectations in this course and may be classified as a Level 3 violation. All academic integrity expectations that apply to in-person assignments, quizzes, and exams also apply online.

Students found in violation of the policy are subject to grade sanctions determined by the course instructor and non-grade sanctions determined by the School or College where the course is offered. Students may not drop or withdraw from courses in which they face a suspected violation. Any established violation in this course may result in course failure regardless of violation level.

Zero tolerance for artificial intelligence use

All generative-AI tools are prohibited in this course because their use inhibits achievement of the course learning objectives. This policy applies to all stages of project and writing processes including researching, brainstorming, outlining, organizing, and polishing. Do not use Generative-AI tools to create any content (i.e., images and video, audio, text, code, etc.).

If you have any questions about a feature and whether it is considered Generative-AI, ask your instructor.

Attendance and Participation Policy:

Course participation entails regular attendance, contribution, and active engagement in lectures, laboratories, and other activities provided in this course. In accordance with their individualized education plan, students who may need special consideration due to a physical or learning disability should see the instructor as soon as possible. **No provisions** will be made if notified **after** examinations. Excuses from class or lab for medical reasons will only be given if such absences are advised by a health care provider or the Health Center based upon clinical findings and prescribed treatment recommendations. Verification must be made in writing. Such absences may be verified. Attendance in classes is expected. Unannounced attendance checks may be taken during the semester.

Electronic Devices

Please silence all electronic devices prior to the beginning of lecture. Please refrain from using these devices during lecture periods.

Discrimination or Harassment

The University does not discriminate and prohibits harassment or discrimination related to any protected category including creed, ethnicity, citizenship, sexual orientation, national origin, sex, gender, pregnancy, disability, marital status, age, race, color, veteran status, military status, religion, sexual orientation, domestic violence status, genetic information, gender identity, gender expression or perceived gender.

FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (FERPA)

The Family Educational Rights and Privacy Act (FERPA) sets forth requirements regarding the privacy of student records. FERPA governs both the access to and release of those records, known as education records, and the information they contain. Under FERPA, faculty have a legal responsibility to protect the confidentiality of student records. For additional information about FERPA and Syracuse University's FERPA policy, see Compliance with the Family Education Rights and Privacy Act or contact the SU Office of the Registrar (315.443.3535).

Lectures

Attendance at lectures is required at every session, whether in person or online. The material covered in the lecture will be illustrative rather than exhaustive. *You should read the material in the text assigned **before** the lecture*. In lectures, alternate ways of understanding the material will often be presented. The examinations, however, will cover **both the assigned text and lecture materials** (whether or not they are specifically covered in the lecture). An **approximate** schedule of class lecture topics and the assigned text is included with this syllabus (please note that it is only an **approximate schedule; see your instructor for more information**).

Related links

Academic Integrity Policy Violation and Sanction Classification Rubric:

https://class.syr.edu/wp-content/uploads/2018/08/Academic-Integrity-Policy-Violation-and-Sanction-Classification-Rubric-Updated-081018.pdf

Statement of Student Rights and Responsibilities
https://policies.syr.edu/policies/academic-rules-student-responsibilities-and-services/statement-of-student-rights-and-responsibilities/

What Students Need to Know about Academic Integrity:
http://class.syr.edu/wp-content/uploads/2018/08/What-Students-Need-to-Know-About-Academic-Integrity-8.6.18.pdf

Religious Policies

SU recognizes the diversity of faiths represented in the University community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes.

Sensitive Material

Because of the nature of the topics covered in this class, the course readings or class discussions may generate intellectual and emotional discomfort. These responses are natural parts of intellectual growth. If, however, your emotional response becomes acute psychological distress (triggering), please communicate with your instructor. Please contact your instructor if you have concerns in this regard.

Student Work

It is understood that registration for and continued enrollment in this course constitutes permission by the student for the instructor to use for educational purposes any student work produced in the course, in compliance with the federal Family Educational Rights and Privacy Act (FERPA). After the completion of the course, any further use of student work will meet one of the following conditions: (1) the work will be rendered anonymous through the removal of all personal identification of the student(s); or (2) written permission from the student(s).

Use of class materials and recordings

Original class materials (handouts, assignments, tests, etc.) and recordings of class sessions are the intellectual property of the course instructor. You may download these materials for your use in this class. However, you may not provide these materials to other parties (e.g., web sites, social media, other students) without permission. Doing so is a violation of intellectual property law and of the student code of conduct.

CHE 113 LAB

Rules and Regulations

1. You will work in pairs in the laboratory, but you are required and responsible for doing your own laboratory write-up.
2. Students are expected to complete their lab on their assigned day and hand-in the laboratory write-up at the end of the laboratory that same day. If a student wants to switch days one week, permission must be obtained from one of the instructors at least one week before the scheduled lab.
3. CHE 113 laboratory is scheduled for 3 hours. Attendance is mandatory. Each student is expected to present at the start of the laboratory, during this time the experimental set-up and safety procedures for each lab is discussed by the instructors. Students who show up late will be penalized.
4. A student may leave the laboratory after completing the experiment, cleanup, and the laboratory write-up (making sure to have each lab initialed and dated by an instructor before leaving or it will be considered late).
5. Leaving early before completing the laboratory will result in a grade of zero for the experiment. The student is reminded that committing to another course, internship, etc. which overlaps the CHE 113 lab is a violation of University regulations.
6. Late labs will be penalized. After five days you will receive a zero for the lab.
7. Each person is responsible for wiping down his/her work area with a damp sponge or paper towel and washing all glassware with soap and water at the end of each lab period.
8. If you are in violation of any safety guidelines, you will be asked to remedy the situation only once. The next time you will be asked to leave lab for that day. There will be no make-up labs.

Safety Guidelines

1. Safety glasses must be worn at all times while in lab. You will be given one warning. If it happens a second time you will be asked to leave lab and you will receive a zero for the lab.
2. Do not wear contacts in lab. Wear your glasses.
3. If glassware breaks and/or chemicals spill, inform the instructor. Do not try and clean the spill and/or glass yourself.
4. If you cut/burn yourself and/or spill anything on your clothing and/or skin in lab, inform the instructor immediately.
5. Long hair must be tied back.
6. Avoid wearing loose clothing and jewelry.
7. Wash your hands before leaving lab and going to the bathroom.
8. Do not sit on the lab benches.
9. Do not eat or drink in lab at any time.
10. No open-toed shoes, sandals or shorts may be worn in lab at any time.

11. Use the disposable gloves provided when required and change them frequently.

LABORATORY SAFETY NOTES
Chemistry 113
Prof. Jim Spencer

Safety is the MOST important issue that you will deal with this semester. Take the laboratory and its risks seriously. Understanding these risks and minimizing them is the best way to avoid accidents. If you follow these guidelines and stay alert to possible hazards, your experience in this course should be a safe and productive one.

SAFETY GLASSES MUST ALWAYS BE WORN IN LAB!!

Hazards

The main potential hazards in the laboratory are fire and exposure to toxic and/or reactive substances. Though toxicity and reactivity of compounds varies tremendously, an excellent policy is to handle EVERY chemical with respect and caution. Be aware that you may be exposed to chemicals in several ways: inhalation, skin contact (some chemicals go right through the skin), and ingestion.

In case an accident occurs, report it immediately! Do not try to hide anything out of embarrassment - you will be making the situation worse, endangering yourself and others. Let the instructors decide on the proper course of action. Those not involved should clear the area.

The following is taken in part from “The Organic Chem Lab Survival Manual”, by James W. Zubrick. Please excuse the jokes he uses, I will not claim any responsibility for them.

SAFETY FIRST, LAST, AND ALWAYS

Disobeying safety rules is not at all like flouting many other rules. You can get seriously hurt. No appeal.

1. Find out how you would get medical help, if you needed it.
2. Always wear your goggles. Eye injuries are extremely serious, but they can be mitigated or often prevented if you keep your goggles on at all times. There are several types of eye protection available, some acceptable, some not, according to the local, state, and federal laws. I like the clear plastic jobbers that leave an unbroken red line on your face when you remove them. Sure they fog up a bit, but the protection is superb. Also, think about getting chemicals, or chemical fumes trapped under your contact lenses. Then don't wear them to lab. Ever.
3. Touch not thyself. Not a biblical injunction, but a bit of advice. You may have gotten chemicals on your hands, in a concentration that is not noticeable. Sure enough, up go the goggles for an eye wipe with the fingers. Enough said.
4. There is no "away". Getting rid of chemicals is a very big problem. (Throw all waste in appropriately labeled jars).
5. Don't work alone; don't work at unauthorized times.
6. Don't fool around. Chemistry is a serious business. Don't be careless or clown around

the lab. You can hurt yourself or other people. Try not to be somber about it; just serious.

7. Drive defensively. Work in the lab as if someone else were going to have an accident that might affect you. Keep the goggles on because someone else is going to point a loaded, boiling test tube at you. Someone else is going to spill hot, concentrated acid on your body. Get the idea?
8. Eating, drinking, smoking in the lab. Are you kidding? Eat in a chem lab?? Drink in a chem lab??? Smoke, and blow yourself up!!!!
9. Keep it clean. Work neatly. You don't have to make a fetish out of it but try to be neat. Clean up spills. Turn off burners or water or electrical equipment when not in use.
10. Where it's at. Learn the location and proper use of the fire extinguishers, fire blankets, safety showers, and eyewashes.
11. Make the best-dressed list. No open-toed shoes or sandals. No loose-fitting cuffs on pants or shirts. Keep the midsection covered. Tie back that long hair. A small investment in a lab coat can pay off, projecting that professional touch. It gives a lot of protection.

ACCIDENTS WILL NOT HAPPEN

That's the attitude you should hold while working in the laboratory. You are NOT going to do anything, or get anything done to you, that will require medical attention. If you do get cut, and the cut is not serious, wash the area with water. If there's serious bleeding, apply direct pressure with a clean, preferably sterile dressing. For a minor burn, let cold water run over the burned area. For chemical burns to the eyes or skin, flush area with lots of water. In every case get to see a physician.

If you have an accident, tell your instructor immediately. Get help! This is no time to worry about your grade in lab. If you put your grades ahead of your personal safety, be sure to see a psychiatrist after the internist finishes.