

Tentative: Subject to Change

CHEM 205Lxg

Chemical Forensics: the Science, and its Impact

Course Overview:

Chemical forensics can be used to investigate crimes, as well as used to study works of art and other important materials. CHEM 205 is designed for non-science majors and satisfies the Category IV General Education requirement for Science and Its Significance. The purpose of this course is to provide students with an understanding of forensic science by examining the current techniques and instrumentations that are commonly used to analyze chemical, physical and biological evidence. This course will cover the basic science (the chemistry, physics and biology) that is required to understand these analytical techniques, but it assumes no prior science background from the students. In addition, CHEM 205 will also examine the societal impact brought about by the advance of forensic science in various aspects of American society, including law, culture and media.

CHEM 205 will provide an understanding of the importance of chemistry, physics and biology as they are used in forensic investigations. Students will be asked to demonstrate comprehension of basic concepts in the sciences pertinent to the study of forensics and to apply that knowledge to the analysis of material and investigation of crimes during exams. The lecture component is accompanied by a weekly laboratory, in which students will practice their knowledge by analyzing typical data involved in forensic investigations. The laboratory component of CHEM 205 will complement the lecture materials and incorporates practical experience in online research, evidence collection, forensic analyses, data confidence and statistical studies, as well as research into the societal implications of forensic science.

Course Instructors:

Instructor	Office	Office Hour	E-mail
Chi Mak	SSC 705	TBA	cmak@usc.edu
Jessica Parr	SGM 304	TBA	parr@usc.edu
Thomas Bertolini	SGM 310	TBA	tbertoli@usc.edu
Rebecca Broyer	SGM 220	TBA	rbroyer@usc.edu

Lectures:

MWF 12 - 12⁵⁰ in SGM 124

Laboratories:

Ten 2-hour laboratories in SGM 121 over the semester

Website:

<http://chemmac1.usc.edu/205/>

Web and Technical Issues:

Dr. Bruno Herreros

herrerros@usc.edu

Required Text:

Criminalistics: An Introduction to Forensic Science, 10th edition
Richard Saferstein

Laboratory:

The laboratory is completely internet browser based. Since this is the case, laboratory attendance is not required, but it is highly recommended. During the laboratory period, the TA will help students complete the assignment. However, the TA will not do the assignment for you or directly answer assignment questions. They will help you figure out the assignment on your own. All labs are in your own words.

Laboratory Reports:

Lab reports are submitted electronically via a form on the course website and will not be accepted in any other form. Most questions on lab reports will be sufficiently answered in 200 words or less. Students are responsible for submitting assignments on time and for verifying their assignment grades online. Laboratories are due at 5:00 pm one week after your lab section. For example, if your lab section meets on Tuesday, January 15, the lab report must be submitted by 5:00 pm on Tuesday, January 22.

There are ten laboratory assignments worth 20 points each. Late assignments will be graded out of 15 possible points if up to two days late, after which they will not be accepted for any reason. Lab assignments will be digitally analyzed for plagiarism (see http://www.usc.edu/student-affairs/student-conduct/ug_plag.htm for guidelines); identical lab assignments from two or more students will receive zero points and will lead to additional sanctions under University rules and guidelines (see <http://usccollege.adobeconnect.com/academicintegrity> for guidelines). Lab will be graded within one week of submission.

Homework Assignment:

A written homework assignment will be assigned near the end of the semester. The assignment will consist of a few essay questions that will be answered online. The questions will apply to the material that has been covered throughout the semester as well as the ethical implications of what has been discussed. Homework assignments will be digitally analyzed for plagiarism (see http://www.usc.edu/student-affairs/student-conduct/ug_plag.htm for guidelines); identical homework assignments from two or more students will receive zero points and will lead to additional sanctions under University rules and guidelines (see <http://usccollege.adobeconnect.com/academicintegrity> for guidelines).

Exams:

CHEM 205 will have three midterm exams and a final. The lowest of your midterm scores will not count toward your total score in the class. All midterm exams and the final will be comprised of multiple choice questions only.

All three midterm exams begin at 12:00 pm and students will be allowed to enter and take the exam until 12:30 pm. After 12:30 pm, students will be turned away from the examination. Likewise, students in the exam will not be permitted to leave the exam room until 12:30 pm. The final exam begins at 11:00 am and students will be allowed to enter until 12:00 pm.

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No make-up exams will be given. You cannot take exams at any other time. An unexcused missed exam will be considered the one allowed dropped exam. An excused absence (on the basis of proper documentation) from an exam will also be considered the one allowed dropped exam. You cannot miss more than one exam. Speak with the instructor directly by telephone on the morning of (or day before) the absence in the case of illness. In the case of non-illness necessity, bring written verification to the instructor *prior* to the absence. All excuses will be verified. Absences will be excused based on official University policy (verifiable illness or necessity).

A comprehensive final exam will be given on the date and time listed in the Schedule of Classes associated with the lecture time for this course, Friday, May 11th, 11 am - 1 pm. **No early or make-up final will be given.** If you miss the final, a course grade of INC (incomplete) will be assigned. If you know ahead of time you will have a conflict with the final, you should not enroll.

Grading:

- Three midterm exams, 100 points each (top two scores count for total)
- Ten laboratory reports, 20 points each
- Homework Assignment, 25 points
- Final exam, 200 points
- Class Participation, 25 points

Assignments	Points
Midterm Exams	2 x 100 = 200
10 Laboratory Reports	10 x 20 = 200
Homework Assignment	25
Final Exam	200
Participation	25
Total	650

To receive a passing grade, satisfactory work must be done in both the lab and the lecture portions of the course.

Statement for Students with Disabilities:

Any student requesting academic accommodations based on a disability is required to register with Disability Services Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to the instructor as early in the semester as possible. DSP is located in STU 301 and is open 8:30 am - 5:00 pm, Monday through Friday. The phone number for DSP is (213) 740-0776.

Statement on Academic Integrity:

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the

obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. *SCampus*, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix A: <http://www.usc.edu/scampus/>. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: <http://www.usc.edu/student-affairs/SJACS/>

Lecture Schedule:

Date	Topic	Reading
1/14	Introduction/Course Overview	
1/16	Introductory Chemistry: Mass and Matter	pg 94 - 100
1/18	Introductory Chemistry: Inorganic vs Organic Chemistry	pg 120 - 123
1/21	No Class	
1/23	Exploring Chemical Properties with Light I	pg 132 - 137, 149 - 154
1/25	Exploring Chemical Properties with Light II	pg 132 - 137, 149 - 154
1/28	Guest Lecturer: Forensic Chemist	
1/30	Guest Lecture Discussion	
2/1	Properties of Organic Compounds I	Chapter 8
2/4	Properties of Organic Compounds II	Chapter 8
2/6	Properties of Acids and Bases	Chapter 9
2/8	Introduction to Error and Noise	
2/11	Review for Exam 1	
2/13	Exam 1	
2/15	X-ray analysis	pg 158 - 159, 342 - 346
2/18	No Class	
2/20	Guest Lecturer: Art Expert	
2/22	Guest Lecture Discussion	
2/25	Lecture on Heavy Metal Poisoning Lab	
2/27	Isotopic Analysis I	pg 155 - 158
3/4	Isotopic Analysis II	pg 155 - 158
3/6	DNA I	Chapter 11
3/8	DNA II	Chapter 11
3/11	Guest Lecturer: Media or Cinema	
3/13	Exam 2	
3/15	Guest Lecture Discussion	
3/18-3/22	Spring Break: No Class	
3/25	Toxicology I	pg 227 - 235
3/27	Toxicology II	pg 227 - 235
3/29	Lecture on Toxicology Lab	
4/1	Chemistry of Fire I	pg 354 - 361
4/3	Chemistry of Fire II	pg 354 - 361
4/5	Chemistry of Explosions	pg 374 - 379
4/8	Limitations of Forensic Science I	<i>Strengthening Forensic Science in the United States: A Path Forward</i>
4/10	Limitations of Forensic Science II	<i>Strengthening Forensic Science in the United States: A Path Forward</i>
4/12	Limitations of Forensic Science III	<i>Strengthening Forensic Science in the United States: A Path Forward</i>

4/15	Guest Lecturer: Lawyer	<i>A Study of Juror Expectations and Demands Concerning Scientific Evidence: Does the "CSI Effect" Exist?</i>
4/17	Exam 3	
4/19	Guest Lecture Discussion	
4/22	Watch NOVA Sciencenow: Can Science Stop Crime?	
4/24	Watch NOVA Sciencenow: Can Science Stop Crime?	
4/26	Discussion of NOVA Sciencenow: Can Science Stop Crime?	
4/29	Future Outlook: Ethics	<i>Forensiphilia: Is the Public Fascinations with Forensic Science a Love Affair or a Fatal Attraction?</i>
5/1	Future Outlook: Ethics	<i>Forensiphilia: Is the Public Fascinations with Forensic Science a Love Affair or a Fatal Attraction?</i>
5/3	Review	

Lab Schedule:

Date	Experiment	Due Date
1/28	Molecular Structures	
2/4	Identifying Criminals	
2/11	Narcotics	
2/18	Blood Alcohol	
2/25	Arson: Frontline – Death by Fire	
3/4	Heavy Metal Poisoning	
3/11	Fibers, Paints, Inks	
3/25	Firearms	
4/1	Toxicology: GC/MS	
4/8	Forensics of Doping in Sports: Ethics	