

Forensic Science: evidence, expertise, & policy

Aims: to introduce the theoretical framework of forensic science; to familiarize students with a range of forensic techniques, forensic jargon, and forensic procedures and protocols; to provide an overview of related disciplines and issues, such as evidence admissibility, the CSI effect, and human rights; to examine the pitfalls of relying too heavily on forensic evidence.

Learning Goals:

1. Competence:

a.) *Theory.* Students who complete this course module should understand and be able to articulate, both orally and in writing, the core theoretical concepts that form the foundations of the forensic analysis of evidence, forensic research, and policy-making related to forensic science within criminology and criminal justice today. Core concepts are derived from scientific techniques used to examine and analyze evidence from a variety of disciplines, including biology, chemistry, and social sciences. Theoretical literacy should extend to international approaches to forensic science.

b.) *Institutions.* Students who complete this course module should understand the role of forensic science within three types of institutions: Police, Laboratories, and Courts. In addition, students should know how institutional forms vary across jurisdictions and how these institutions interact with and influence each other. Finally, students' knowledge will include those agencies that regulate forensic science, forensic science as a private industry, and the important professional associations to forensic practitioners.

c.) *Research Methods.* Students who complete this course module should be familiar with the tools, techniques, and data sources necessary for empirical analysis. Students should understand the various ways that empirical analysis is used in the scientific approach: for description, for developing, and for testing theories. They should be familiar with basic forensic techniques and how to clearly articulate result findings. They should be able to read and assess research from a wide range of sources, including general interest, academic, and government publications.

2. Critical Thinking: Upon completion of the major students should be able to apply their understanding of core concepts and quantitative tools to analyze and research real world problems, and evaluate alternative policy proposals on a range of forensic issues, from micro-level analyses relevant to particular cases to management concerns to macro-level analyses of legislative and other broad-scale policies. Accomplishment of this goal will require that students can apply their literacy and numeracy skills to different institutional structures, within the U.S. and across countries.

3. Scholarship: Qualified majors should have an opportunity through such avenues as advanced coursework, internships, and faculty interactions to conduct independent research on matters of central relevance to the field of forensic science.

Course Structure: The aims of the course will be delivered through a series of lectures, class discussions, and practical exercises. Group work will draw on news items, case studies, and an expert witness statement writing practical followed by a mock trial exercise. We will also debate verdicts that were dependent on forensic evidence and cases where the forensic evidence was thrown out of the trial.

Course Duration: Each session will run for a total of 2.5 - 3 hours with a 10min mid-session break. The course will run over 14 weeks.

Session Descriptions:

1. Welcome, Course overview, Useful resources, History of forensic science

This session will provide an introduction to the course and the expectations of both the instructor and students. A number of useful forensic resources will be covered such as key texts, journals, online databases, and networking sites. The course will officially start with an overview of the history of forensic science and major milestones for the discipline.

2. Making Science Forensic: methodology, protocols, & procedures

What differentiates "science" from "forensic science?" This session will cover the protocols, procedures, and theoretical framework that govern forensic scientists. How should a forensic expert approach evidence? Is there a difference between working for the prosecution or defense?

3. Forensic science, the media, and the CSI effect (class discussion)

The recent glut of forensic television series, both fictional and "factual," has caused a noticeable impact on the discipline. As these series prove to be hugely popular, how have they influenced our views of forensic science? From the "educated" jury to the unquestioning public defender, the media portrayal of forensic expertise has a lot to answer for. How do we combat this influence both in the jury, and in ourselves? This session will explore the pros and cons of the "CSI effect" and how we can effectively work alongside it.

4. Forensic science, crime science, and public policy

Crime science is one of the newer tools to criminal justice. It aims to use the knowledge of the causes of crime (criminology) to help prevent crime. Crime science combines a range of disciplines towards "out-designing" crime. Both forensic science and crime science impact policy making. Conversely, forensic applications are sometimes controlled and often limited due to public policy. We will explore the interplay between politics, policy making, and forensic science.

5. Forensic science and the criminal justice system (3-5pg paper due)

Daubert v Meryl Dow Pharmaceutical is the crucible by which all forensic evidence is judged in the United States. How does the Daubert criteria determine what makes evidence "scientific" and, therefore, admissible? This session will look at the case law in relation to forensic admissibility, the National Institute of Standards and Technology (NIST), and the state of forensic science practice in the USA.

6. Forensic science and human rights (class discussion)

Forensic techniques such as forensic anthropology and archaeology are frequently used to recover and identify victims of human rights abuses who have been interred in mass graves. We will discuss several cases brought before the European Court of Human Rights, the International Criminal Court, and the

International Court of Justice. The second half of the session will look at the human rights implications of DNA and fingerprint databases and how forensic techniques can impinge on privacy rights.

7. The Evidence of identification

This session will cover the most common forensic techniques used in criminal law –DNA profiling, pathology, and psychological profiling. We will briefly go through each of the techniques and some of the common terminology. Time allowing, we will look at other fields of identification including tool mark analysis, blood splatter, trace evidence, and forensic odontology.

8. Forensic archaeology and anthropology (mid-term exam)

Forensic archaeology aims to recover and interpret the remains of past human activity and runs parallel to crime scene examination. Typically, forensic archaeologists excavate clandestine graves. Forensic anthropology aims to analysis human skeletal remains to determine gender of the deceased, time since death, and to identify signs of trauma and/or pathology. We will look at both techniques in turn, their strengths and weaknesses, and how they (should) work together.

9. Fingerprinting (practical exercise)

Over a hundred years since its “invention,” fingerprinting is still the ultimate means of identification. While latent print examiners, as fingerprint experts are know, utilize techniques derived from chemistry, fingerprinting itself is hardly a science. Recently, fingerprinting has come under intense scrutiny thanks to the Daubert criteria and the National Academy of Sciences’ 2009 report. In this session we will learn the basics of fingerprint analysis, comparison, and evaluation as well as the recent challenges to the oldest form of forensic identification.

10. Mass fatality incidents

A mass fatality incident is one in which the number of causalities exceeds the local resources. These can be either natural disasters or man-made events. We will look at several types of mass fatality incidents and the response framework. We will also cover the national Incident Management System (NIMS) and the role of FEMA (Federal Emergency Management Agency). Finally, we will investigate several recent mass fatality incidents and the role of forensic scientists in the subsequent investigations.

11. Environmental evidence (practical exercise)

Although a new addition to the forensic tool kit, environmental evidence has seen a dramatic increase in use recently. Soil, plant remains, and pollen are the “fingerprints” of an outdoor scene and provide useful clues to the investigator. This session will cover the basic principles behind soil & pollen analysis and environmental profiling. Time permitting, we will also discuss forensic entomology.

12. Crime scene investigation

Most often associated with forensic science, crime scene investigation is not science at all. Rather it is the methodology by which a scene is processed and evidence is collected for later analysis by forensic scientists. This session will examine this methodology in a number of jurisdictions and in scenarios ranging from a common burglary to a large-scale terrorist attack. We will discuss documentation of the scene, identifying and preserving evidence, chain of custody, and several illustrative case studies such as the OJ Simpson case.

13. Preparing expert testimony for court

The last two sessions of the course will focus on the culmination of all investigations and forensic analyses – the criminal trial. Specifically, we will examine the role of expert witnesses. Many of the topics from previous sessions will be reviewed such as the CSI effect on juries, the Daubert criteria, and the NAS report. Finally, we

will cover the expert witness statement. Students will choose from one of the forensic sciences covered in the course and will create a case in which they served as the scientist. They will draft an expert witness statement that will be examined and cross-examined in the mock trial.

14. Mock trial (Report due)

The final class for this course will be a mock trial in which each student will appear as an expert witness to be examined and cross-examined on their statement prepared in session 13.

Forensic Evidence Addressed:

- Fingerprinting
- DNA Profiling
- Odontology
- Anthropology
- Mineralogy
- Environmental Profiling
- Entomology
- Palynology (Pollen)
- Archaeology
- Anthropology
- Trace evidence

Forensic Protocols:

- Crime Scene Examination
- Documentation
- Evidence Integrity

Expert Witness Statements:

- Statistical Analysis
- Impartiality
- Creating a Narrative
- Expert Opinion vs Fact
- Avoiding Common Errors

Course Assessment: Students will be required to take a mid-term exam and write an essay in lieu of a final exam. Class discussion, homework assignments, a short essay, and a mock expert witness statement will also count towards the final grade. Students' verbal performance in the mock trial will not be formally graded. Practical exercises provide hands-on experience of a particular forensic technique and are not assessed.

1. Mid-term exam – 20%
2. Final essay – 20%
3. Short essay – 10%
4. Mock expert witness statement – 10%
5. Class discussion/participation – 20%
6. Homework assignments – 10%
7. Reaction papers – 10%

Required Text: There is no required text book for this course. Weekly reading assignments will be posted on the course SAKAI site. Students will be provided with a “further reading” list for each topic for optional reading.