Unit 1: Intro to Forensic Science and the Law

Forensic Science = application of science to matters of law.
Crime Stats
CRIME CLOCK

1 VIOLENT CRIME every 22.4 seconds
1 MURDER every 31.0 minutes
1 RAPE every 5.8 minutes
1 ROBBERY every 1.2 minutes
1 AGGRAVATED ASSAULT every 36.8 seconds

1 PROPERTY CRIME every 3.2 seconds
1 BURGLARY every 14.5 seconds
1 LARCENY every 4.8 seconds
1 AUTO THEFT every 28.8 seconds

How many crimes are solved?

![Clearance Figure: Percent of Crimes Cleared by Arrest or Exceptional Means, 2007](http://www.fbi.gov/ucr/cius2007/offenses/clearances/index.html)
Crime Rates Over Time

Is this contrary to what is shown on TV?
Crime Scene Team
## Forensics Team

- **Crime Scene Investigator (CSI)**
- Latent Print examiner
- Ballistics/ Firearms Examiner
- Toolmark Examiner
- Questioned Document Examiner
- Trace Evidence Examiner
- For. Pathologist
- For. Anthropologist
- For. Odontologist / Dentist
- For. Entomologist
- For. Psychiatrist
- For. Serologist
- For. Toxicologist
- For. Botanist
Other Forensic Team Jobs

- For. Wildlife Specialist
- Fire/ Arson Investigator
- For. Artist
- Forensic Engineer
- Forensic Nurse
- Forensic Geologist
- Forensic Computers

- Crime scene clean-up
- Paramedic
- Police Officer
- Prosecutor/ D. Attorney
- FBI, ATF, DEA
Minimum Education Levels
(for most agencies)

2 year/ (AA or equiv) + experience or 4 yrs (BA/ BS)

- CSI
- Latent print
- Tool marks
- Firearm
- Document examiner
- Trace evidence
- Serology
- Toxicologist

Medical School
- For. Pathologist
- For. Dentist
- For Psychiatrist

Graduate school (masters, PhD)
- Entomologist
- Anthropologist
- Any supervisory job
Salary Info.- why such a big range?

**SALARY TABLE 2011-SAC (LEO)**

INCLUDING SPECIAL BASE RATES AT GS-3 THROUGH GS-10 AND

INCORPORATING A LOCALITY PAYMENT OF 22.20%

FOR THE LOCALITY PAY AREA OF SACRAMENTO—ARDEN-ARCADIA—YUBA CITY, CA-NV

(See [http://www.opm.gov/oca/l1tables/locdef.asp](http://www.opm.gov/oca/l1tables/locdef.asp) for definitions of locality pay areas.)

RATES FROZEN AT 2010 LEVELS

EFFECTIVE JANUARY 2011

<table>
<thead>
<tr>
<th>Grade</th>
<th>Step 1</th>
<th>Step 2</th>
<th>Step 3</th>
<th>Step 4</th>
<th>Step 5</th>
<th>Step 6</th>
<th>Step 7</th>
<th>Step 8</th>
<th>Step 9</th>
<th>Step 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$21,755</td>
<td>$22,482</td>
<td>$23,206</td>
<td>$23,926</td>
<td>$24,649</td>
<td>$25,074</td>
<td>$25,789</td>
<td>$26,510</td>
<td>$26,538</td>
<td>$27,213</td>
</tr>
<tr>
<td>2</td>
<td>24,461</td>
<td>25,042</td>
<td>25,851</td>
<td>26,538</td>
<td>26,836</td>
<td>27,626</td>
<td>28,415</td>
<td>29,205</td>
<td>29,994</td>
<td>30,783</td>
</tr>
<tr>
<td>3</td>
<td>32,026</td>
<td>32,916</td>
<td>33,805</td>
<td>34,695</td>
<td>35,585</td>
<td>36,474</td>
<td>37,364</td>
<td>38,253</td>
<td>39,143</td>
<td>40,033</td>
</tr>
<tr>
<td>4</td>
<td>35,951</td>
<td>36,950</td>
<td>37,948</td>
<td>38,946</td>
<td>39,945</td>
<td>40,943</td>
<td>41,941</td>
<td>42,940</td>
<td>43,938</td>
<td>44,937</td>
</tr>
<tr>
<td>5</td>
<td>41,339</td>
<td>42,456</td>
<td>43,573</td>
<td>44,690</td>
<td>45,807</td>
<td>46,924</td>
<td>48,040</td>
<td>49,157</td>
<td>50,274</td>
<td>51,391</td>
</tr>
<tr>
<td>6</td>
<td>43,591</td>
<td>44,836</td>
<td>46,082</td>
<td>47,327</td>
<td>48,572</td>
<td>49,817</td>
<td>51,062</td>
<td>52,308</td>
<td>53,553</td>
<td>54,798</td>
</tr>
<tr>
<td>7</td>
<td>47,060</td>
<td>48,445</td>
<td>49,829</td>
<td>51,214</td>
<td>52,599</td>
<td>53,983</td>
<td>55,368</td>
<td>56,752</td>
<td>58,137</td>
<td>59,521</td>
</tr>
<tr>
<td>8</td>
<td>49,050</td>
<td>50,582</td>
<td>52,115</td>
<td>53,647</td>
<td>55,179</td>
<td>56,712</td>
<td>58,244</td>
<td>59,777</td>
<td>61,309</td>
<td>62,841</td>
</tr>
<tr>
<td>9</td>
<td>52,482</td>
<td>54,175</td>
<td>55,867</td>
<td>57,560</td>
<td>59,252</td>
<td>60,945</td>
<td>62,637</td>
<td>64,330</td>
<td>66,022</td>
<td>67,715</td>
</tr>
<tr>
<td>10</td>
<td>57,797</td>
<td>59,662</td>
<td>61,526</td>
<td>63,391</td>
<td>65,256</td>
<td>67,121</td>
<td>68,986</td>
<td>70,850</td>
<td>72,715</td>
<td>74,580</td>
</tr>
<tr>
<td>11</td>
<td>61,451</td>
<td>63,499</td>
<td>65,547</td>
<td>67,595</td>
<td>69,643</td>
<td>71,691</td>
<td>73,739</td>
<td>75,787</td>
<td>77,835</td>
<td>79,883</td>
</tr>
<tr>
<td>12</td>
<td>73,655</td>
<td>76,110</td>
<td>78,565</td>
<td>81,020</td>
<td>83,475</td>
<td>85,930</td>
<td>88,385</td>
<td>90,840</td>
<td>93,295</td>
<td>95,750</td>
</tr>
<tr>
<td>13</td>
<td>87,586</td>
<td>90,050</td>
<td>93,424</td>
<td>96,344</td>
<td>99,263</td>
<td>102,182</td>
<td>105,102</td>
<td>108,021</td>
<td>110,940</td>
<td>113,860</td>
</tr>
<tr>
<td>14</td>
<td>103,500</td>
<td>106,949</td>
<td>110,399</td>
<td>113,849</td>
<td>117,299</td>
<td>120,748</td>
<td>124,198</td>
<td>127,648</td>
<td>131,097</td>
<td>134,547</td>
</tr>
<tr>
<td>15</td>
<td>121,745</td>
<td>125,804</td>
<td>129,862</td>
<td>133,920</td>
<td>137,978</td>
<td>142,037</td>
<td>146,095</td>
<td>150,153</td>
<td>154,212</td>
<td>155,500</td>
</tr>
</tbody>
</table>

[http://per.lacity.org/psb/lapd_salary.htm](http://per.lacity.org/psb/lapd_salary.htm) (LAPD)
Locard’s Principle
Locard's Principle
"every contact leaves a trace".

- Edmond Locard- Director of first forensics lab, France 1920’s

- "It is impossible for a criminal to act, especially considering the intensity of a crime, without leaving traces of this presence."

- Only human failure to find it, study it and understand it can diminish its value.
Crime Labs
US Forensic Science System

- Most are publicly funded
- Most located within a law enforcement agency (potential bias issues??)
Federal Govt. Labs

• **FBI Laboratory**
  – one of best-known & most prestigious in world (Virginia)
  – Also help w/ local & state evidence (even foreign countries)

• **DEA** (Drug Enforcement Admin.)
  – Analyzes illicit drugs
More Govt. Labs

- **The Secret Service**
  - counterfeit money & credit cards
  - includes the world's largest ink library.

- **Bureau of Alcohol, Tobacco, Firearms, & Explosives (ATF)**
  - experts in explosive and fire analysis

- **IRS**
  - questioned documents (handwriting, typewriting, printers, inks, and papers).
More Govt. Labs

- **US Fish and Wildlife** (Ashland, OR)
  - 1st & only lab that specializes in wildlife forensics.
  - Prevent poaching and hunting of endangered species

- **US Postal Service**
  - Involves mail crimes
    Ex: fraud, extortion, mailing anthrax to govt. official, illegal gambling.
  - Document analysis, but trace evidence & fingerprints too.
Private Labs

– Usually work for defendants (people accused of crimes)
– Public funds don’t cover (defendants have to pay for)

– Ex: National Forensic Support Lab (http://nfslab.com/)
Huge Growth in Crime Labs over last 35 years

1) **1960’s Miranda Rights**
   - ruled out confessions as a legal tool
   - forced an emphasis on scientific data.

2) **Drugs**
   - All drugs seized during arrests must be sent to lab for testing
65% of overall submissions to crime labs - drugs
Types of Witnesses
Forensic Scientists

2 main roles:
1) Analyze evidence
2) Testify in court as an expert witness

Note: In past, many used to be police officers, but special science training is now needed.
Forensic Scientist as Expert Witness

- Must be qualified as an expert every time he/she testifies in court (experience/education)
  
  (see link: http://www.pathologyexpert.com/drmelinek.htm)

- Rely on reports written (sometimes written years before)

- Can offer opinion (frequently given hypothetical questions).
  
  Ex: Child abuse
Lay Witness

Lay witness -
- Eyewitness to crime
- victim
- knows something about the suspect.

- No opinions!

- Ex: lay witness can’t say that a driver was drunk...
  ...what can they say?

“My husband is a very large, loud and obnoxious man. OK, sure, I tried to hire a hit man. But just to hit him.”
Admissibility of Evidence
Admissibility of Evidence (all types)

Judge decides what evidence can come before the jury (pre-trial hearings)

1) **Must have something to do with the current case**
   - ex: sexual history in Casey Anthony case (see link)

2) **Must prove something**
   - Cadaver dogs in Casey Anthony case (see link)

3) **Gained legally:**
   - ex: Miranda?
   - Search warrants? - no hearsay
   - protection for privileged info. (spouses, lawyers, and clergy)
Admissibility of Scientific Evidence:

2 Standards: *Frye & Daubert*

Want to avoid “junk science” in court

- **Frye Standard** (1923) - scientific evidence must be “generally accepted”
  - lie detector tests (usually denied)
  - Air samples from car trunk?
    (see video clip)

- **Daubert Standard** (1993)
  - Judge is gatekeeper, can let new tests in
  - Must be based on sound scientific principles
I found an expert witness who can testify to a reasonable degree of scientific certainty that you need some drugs to calm yourself down for once.
OK, I'll talk, but I want my attorney present.

Baby's first words
FYI-Daubert Ruling (Background)

- Daubert v. Merrell Dow Pharmaceuticals- 1993
- Parents sued Dow, said birth defects caused by drugs made by Dow
- The families used epidemiology/statistics to prove their case.
- Dow statisticians got different results and lawyers objected to the families scientists as being outside the “general acceptance” (the old gold standard).
Controversial
• Reliability (87% - 50% accurate)
• Accuracy depends heavily on the operator
• Results can be manipulated

Private use
• used widely in private and public employment

Court use
• Most states / military courts = inadmissible for all purposes.
• New Mexico = generally admissible

See “how to beat polygraph” online
Civil vs. Criminal Law
# Civil Law vs. Criminal Law

**Civil**
- Ex: divorce, property disputes, child custody
- Person / company files a lawsuit (plaintiff)
- Burden of proof: Low (51% responsible to be held liable)
- Liable or not liable
- Loser pays for losses/damages

**Criminal**
- Ex: Assault, robbery, murder
- Govt. files lawsuit (District Attorney/prosecutor)
- Defendant has certain protections (free defense= public defender), etc
- Govt. must show “beyond a reasonable doubt” (high level of certainty)
- Guilt or Not guilty (acquittal)
- Prison/ Jail/ money

EX: OJ Simpson acquitted in criminal court, but sued and loses in civil court for wrongful death.
Criminal Cases continued...

• plea bargain
  – (90%) Most criminal cases end with a plea
    • Lesser charge
    • Lesser offense
  – Avoids costly trials
  – Some say certain groups forced to take plea more often

• Statute to limitations
  – No state has a statute of limitation for the crime of murder.
  – Many states also include kidnapping, arson, crimes of violence or sex offenses with children as crimes that are not afforded a statute of limitations.
Casey Anthony

Criminal Case

• Not guilty
  – 1st degree murder
  – Aggravated child abuse
  – Aggravated manslaughter

• Guilty
  – 4 misdemeanor counts of providing false info to police

• Who paid for defense?
  – Taxpayers in FL (~$140,000, but no lawyer fees included)
  – ABC News gave $200,000 for pictures (controversial)

Civil Case

• Still pending
  – Defamation suit filed by Zenaida Gonzalez (was tormented when her name was used by Anthony)
Observation Skills
Forensic Investigators must learn to be excellent observers.

They must find, document, and interpret evidence.
Perception is Faulty

- It is not always accurate
- It does not always reflect reality
What do you see?
Which one’s bigger?
How many legs?

Is the green side in the front or back?
Why is perception faulty?

- Our brains can filter out or change information from our senses
- And...

THE BRAIN FILLS IN THE GAPS

(see “awareness test” & “bunny effect” video)
Can you read this?

Raednig thsee wrods semes to be esaeir tahn you mgiht hvae tohuhgt; waht colud epxlian tihs?

Aoccdrnig to a rscheearch at Cmabrigde Unievrtisy, it deosn't mttaer in waht oredr the ltteers in a wrod are, the olny iprmoetnt tihng is taht the frist and lsat ltteer be at the rghit pclae. The rset can be a toatl mses and you can sitll raed it wouthit porbelm. Tihs is bcuseae the huamn mnid deos not raed ervey lteter by istlef, but the wrod as a wlohe.
How to be a good observer

1) **Observe systematically** - start on one side & move across

2) **Turn off filters** - make a conscious effort to pay attention to details

3) **Interpret information later**

4) **Document, Documents, Document** - written & photos