BIOL 104 Forensic Biology

Exam III Review

**Chapter 9 Forensic Toxicology**

1. What is toxicology?
2. What activities are considered part of forensic toxicology?
3. What is the Controlled Substances Act and how does it classify drugs?
4. How do schedule I, II, III, IV and V drugs differ?
5. What is a poison? What is meant by the term “sufficient quantities”?
6. What is the difference between an intoxicant and a true poison?
7. What does a forensic toxicologist do?
8. Why are toxins described as “sneaky”?
9. What are the best places in the body for testing samples? What are the advantages or disadvantages of each place?
10. What are color tests? Know how the Marquis and Duquenois-Levine Tests are used to detect specific drugs.
11. Know how immunoassays, gas chromatography, ultraviolet (UV) spectroscopy, and mass spectrometry (MS) are used.
12. How can toxins be administered and how does this affect where they are found in the body?
13. Why is the route of entry important to determine?
14. Know the difference between normal, therapeutic, toxic and lethal concentrations. What is the LD50? Why are these categories not exact?
15. What are the responsibilities of the toxicologist?
16. Know the differences between familiar poisons like cyanide, strychnine, mushrooms, ethylene glycol (antifreeze), oxalic acid, heavy metals, insulin, succinyl choline, and corrosive chemicals.
17. Know the differences between drugs considered to be depressants, stimulants, hallucinogens, narcotics and anabolic steroids.

**Lab 9 Analysis of Drugs and Poisons**

1. What is pH? What pH levels are considered acidic? What pH level is considered neutral? What pH levels are considered basic?
2. Be able to analyze the results of known and unknown samples to identify an over-the-counter drug.
3. What is LSD and how can it be identified? What is a false positive?
4. What is marijuana and how can it be identified?
5. What are lead and mercury and how can they be identified?
6. Be able to calculate the Rate of flow (Rf) in order to determine the identity of an amino acid and the type of heavy metal poisoning that occurred.

**Chapter 11 DNA: The Indispensable Forensic Science Tool**

1. What is DNA? What are the nitrogenous bases found in DNA? Be able to label the structure of DNA.
2. Who discovered the structure of DNA?
3. What is a chromosome? What are autosomes? What are sex chromosomes?
4. What is the difference between monozygotic and dizygotic twins?
5. What is transcription? What is translation?
6. What is RNA? What are the nitrogenous bases found in RNA?
7. What are proteins?
8. Know how to use the genetic code to determine the amino acid sequence of a polypeptide when given the sequence of mRNA.

e.g. AUG CAG GUC UCA UAG

1. What are mutations?
2. What are RFLPs?
3. How is DNA replicated? What enzymes are involved in the process? What is the difference between the leading and lagging strands?
4. What is PCR? What reagents are needed for PCR? What steps are involved in PCR? How does PCR change the amount of a specific DNA sequence?
5. What are STRs?
6. What is capillary electrophoresis?
7. What is CODIS? How many standard STRs are used by CODIS?
8. How can the sex of an individual be determined using DNA?
9. What is mtDNA and how is it used?
10. How does DNA sequencing work?
11. What are DNA chips or microarrays?
12. What are SNPs?
13. How should biological evidence be collected and handled?
14. What are substrate controls? What are standard/reference DNA samples?

**Lab 10 DNA Collection**

1. What is a buccal swab? What types of cells are found on the inside of your cheeks? Where is DNA located in your cheek cells?
2. What does a micropipette do? Why must pipette tips be changed between reagents?
3. What does a vortex do? What does a microcentrifuge do?
4. What does the term supernatant mean?

**Lab 11 PCR & DNA Fingerprinting**

1. What reagents are needed for PCR and what does each do?
2. What is the purpose of the different temperatures in PCR?
3. How many copies of the target DNA sequence will be generated from one copy of template DNA after n rounds of PCR?
4. Why is the amelogenin locus analyzed?
5. What is CODIS? How many standard STRs are used by CODIS? Which standard STRs did we analyze?

**Lab 12 DNA Gel Electrophoresis**

1. How is DNA separated by gel electrophoresis?
2. What is a DNA ladder, or marker?
3. What is the purpose of using negative controls?
4. Know how to analyze DNA fingerprinting results to determine which suspect’s DNA matches DNA found at the scene of a crime.

**Chapter 20 The Future**

1. Why is there a need for trained and knowledgeable evidence collectors?
2. What overburdens crime labs?
3. How will undergraduate and graduate programs in forensic science affect the field?
4. Why is the demand for DNA profiling increasing?
5. How have computer databases helped investigators?
6. Why must more time and effort be devoted to class evidence?
7. What is essential for crime labs to develop?
8. What important conclusion was made in the 2009 National Academy of Science report *Strengthening Forensic Science in the United States: A Path Forward?*

**Student Presentations**