Criminal Science (Hon 313)
Lecture 9:30 am-11 Tu/Th, NE273

Instructor:
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Office hours-email for appt, many times possible


Additional course documents will be on Blackboard, these will include readings on current events in the science and forensic community.

Course description:
This course will examine how chemistry and science is present in our everyday lives, and how it can be used to solve specific problems or questions. The focus will be on scientific literacy in the context of forensics. We will learn about the scientific method, basic chemistry, how radioactivity is used to date potentially forged objects, and the many areas of the forensic laboratory that use science to answer questions of law.

Questions are welcomed, no one will ever be embarrassed or made to feel bad for asking questions.

Course objectives- At the end of this class students should be able to:
1. Question how the media (particularly television) presents scientific techniques.
2. Differentiate the components of the atom and how changes in them allow scientific measurements.
3. Describe the scientific method and recognize types of, and changes in, chemical compounds.
4. Know the types of examinations commonly performed in a forensic lab, and explain the scientific basis behind them.
5. Explain the difference between class and individual characteristics in evidence.
6. Recognize the types of examinations scientists perform in authentication of artwork, and articulate the basic scientific principles behind the exams.
7. Understand how associated specialty fields of pathology, toxicology, and entomology contribute to the analysis of a crime scene.
8. Summarize the ways that DNA is used to determine genetic identity.
9. Explain criminal justice concepts that apply to analysis of samples in the crime lab.

In addition For the Honors program:
A. Examine phenomena from diverse perspectives not confined to a single academic discipline, and draw interdisciplinary connections among disparate disciplines.

B. Express criminal justice ideas with clarity and purpose, both orally and in writing, and demonstrate these communication abilities in multiple contexts to a variety of audiences.

C. Apply knowledge and theory of scientific issues learned in class toward the solution of “real world” issues or problems.

Student disability statement:
If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619)594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that I cannot provide accommodations based upon disability until I have received an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Academic dishonesty:
Plagiarism in written materials submitted will result in a score of zero and potential referral to center for student rights and responsibilities. Cheating on exams by copying answers is likewise prohibited. I expect that all work will be original and your own.

Exams and grading:
Final grades will be based on 2 exams worth 100 points each, class participation of 100 pts, a writing assignment worth 50 points, and two projects worth a total of 50 points, for a total of 400 points. Grades are based on a percentage of the total points achieved, and will be assigned according to the following ranges:
- 90-100% = A
- 80-89% = B
- 70-79% = C
- 60-69% = D
- below 60% = F
The lower 2% of each range is a minus, the highest 2% of each range is a plus.

Exam:
Questions will be multiple choice and true/false as well as short answer. The final will be cumulative, but will emphasize the last part of the semester. Exam questions will be drawn from the lectures, as well as assigned reading material and videos shown in class.

Class participation:
I will
- post articles on blackboard along with discussion questions on those articles. I expect you to come to class prepared, read the articles in advance, have thoughts to contribute on the discussion topics.
- Ask questions of you to answer during the lectures. These will be based on the powerpoint lectures

Writing assignment:
Three page paper, our topic is how science has been used to solve a problem or answer a question. The paper should identify and describe the question or problem and give a complete description of the technique used in the solution. You should consult at least 3 sources for this paper, and include references. The paper should be single spaced, 12-point font and three full pages long. It is worth 50 points: 25 points will be given for quality of scientific explanation including a clear identification of the question the science can answer, and 25 points for writing accomplishment- spelling, grammar, correct sentence structure and coherent paragraphs, etc. It is due at the beginning of class on Th Apr. 30, but it may be turned in earlier. There will be a penalty of 5 points for each class period the paper is late.

The magazines Scientific American or Discover may contain useful ideas, and the web sites http://www.livescience.com/ and http://science.physorg.com/ often have intriguing articles.

Some ideas recently in the news-
Fake? Authenticating the Vinland map
The Innocence Project; freeing the unfairly convicted with DNA testing
Finding arson residues in burned buildings
Accident reconstruction using forensic engineering
Using ultraviolet light to provide safer drinking water
How DNA analysis is used to trace ancestry

Project assignments: Choose 2 out of 3

1. A poster illustrating a scientific concept discussed in class. Find an interesting aspect of Forensic science and complete a poster board and present it to the class. You will give a 5 minute presentation of your work on the due date. Past projects have included fingerprints, soil geology comparisons, maggot development, comparison of fired bullets and cartridges from guns, toxicology testing kits, accident reconstruction, forensic biology, etc. A large variety is possible. 25 points.

2. Find a newspaper or magazine article dealing with chemistry, forensics, or scientific progress. (you may download from the internet but it MUST have a date of 2017 or later on it). Write a 2 paragraph summary of the article (at least 10 sentences) covering how it related to the class and what new information you learned from reading it. Staple the article to the paragraph and turn in together. 25 points

3. Choose one- 25 points
   A) Examine a television show that uses science and scientific theory principles to convey a point to the audience. Mythbusters is an excellent example of a show which does this regularly. Answer questions on the BB worksheet
   B) Watch an episode of CSI, Bones, or other fictional show that presents scientific possibilities. Find 10 mistakes, list and detail how the information is incorrect and explain what improvements you would make in how the information is presented.
FERPA privacy rules will be respected in this class.

You will have the opportunity to help demo forensic concepts on Explore SDSU day, Sat. March 21 from around 9-2 with a short training session the day before. Volunteering for this will allow you to skip either the paper or project assignments (in other words, you get the full 50 pt credit for it). Food will also be provided.

The lecture schedule below is approximate, but exam dates will not change, plan accordingly!

**Lecture schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tbody>
<tr>
<td>T 1/28</td>
<td>scientific method</td>
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<tr>
<td>Th 1/30</td>
<td>Crime scenes</td>
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<tr>
<td>T 2/4</td>
<td>Physical evidence, class vs. individual characteristics</td>
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<td>Th 2/6</td>
<td>Bloodstain pattern analysis</td>
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<tr>
<td>T 2/11</td>
<td>Pathology and entomology- How did they die -how long have they been there?</td>
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<tr>
<td>Th 2/13</td>
<td>Pathology and entomology continued</td>
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<tr>
<td>T 2/18</td>
<td>Fingerprints</td>
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<tr>
<td>Th 2/20</td>
<td>Fingerprints continued</td>
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<tr>
<td>T 2/25</td>
<td>Microscopy</td>
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<tr>
<td>Th 2/28</td>
<td>Firearms and tool marks</td>
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<tr>
<td>T 3/3</td>
<td>Firearms and tool marks continued</td>
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<tr>
<td>Th 3/5</td>
<td>Matter, light, and glass</td>
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<tr>
<td>T 3/10</td>
<td>Physical and chemical properties- Compare soil sample composition</td>
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<td>Th 3/12</td>
<td>Hairs and fibers</td>
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<tr>
<td>T 3/17</td>
<td>Exam 1</td>
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<tr>
<td>Th 3/19</td>
<td>Hairs and fibers</td>
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<tr>
<td>T 3/24</td>
<td>Drugs</td>
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<td>Th 3/26</td>
<td>Toxicology</td>
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Spring Break

T 4/7    Metals, paint, soil- trace evidence
Th 4/9    Serology

T 4/14    Serology
Th 4/16    DNA

T 4/21    DNA
Th 4/23    DNA

T 4/28    Arson investigation **Poster project with 5 minute presentations due today at beginning of class and Article / TV show project due today at beginning of class**

Th 4/30    Arson continued **Paper due today, at beginning of class**

T 5/5    Radiocarbon dating
Th 5/7    **Crime Scene**- collect the evidence, send to the lab

**Final is Thursday May 14 from 8 am-10 am (note- this is earlier than class time)**