

## **Course Outline: NATS 1575-Introduction to Forensic Sciences**

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Forensic Science is the application of Science to law. This course uses the versatile and fascinating field of Forensics to introduce the principles of science, techniques and role of the expert witness in crime. Topics in analysis of drugs, toxins, fire residues, paint, glass, hair, fibres, blood spatter, fingerprinting, DNA, Anthropology, and Psychology will be considered.

Case studies ranging from the use of Forensic Entomology in estimation of time of death, to tracing explosives in bomb blasts, hair analysis in crime, and importance of bite mark evidence will be discussed. Videos featuring investigative techniques in crime science, role of Forensic Odontology, Plant DNA, Toxicology, Forensic Microbiology, Forensic Anthropology, Forensic Psychology and the societal impact and relevance of landmark cases will be examined.

The course, will provide students with an introduction to a field which is deeply rooted in scientific concepts, but which also has a wide ranging influence on the criminal justice system and on society. The course is intended for students specializing in non-science and non-technology subjects. The objective is to thus to enable students to experience disciplines outside their fields of professional specialization and develop their capacity to understand science from a social and cultural context.

Mathematics is limited -- Minimal arithmetical calculation at about Grade 10 level.

Format: One 3-hour lecture per week

Class Meeting Times: **Tues/Thursday 4-5.30 pm (VC 135)**

### ***Course Objectives***

By the end of the course, students will have demonstrated the ability to:

1. Explain the role and responsibilities of the expert witness
2. Understand the social impacts of landmark cases
3. Develop logical and coherent arguments based on scientific principles
4. Critically evaluate media reports about forensics and crime science
5. Effectively communicate a clear and scientific understanding of forensic issues
6. Explain the role of the forensic scientist in the investigation of crime
7. Understand the methods used in the analysis of physical evidence and the procedures for conducting investigations
8. Gain an appreciation of the scientific techniques used in organic and inorganic analysis, finger prints, body fluids and techniques for firearms and other impressions

The class will be conducted through interactive lectures, case studies, videos, in-class discussion and reading assignments.

The written report will develop skills in writing, critical thinking and analysis so that student will learn to address a forensic case, discuss the scientific concepts, and techniques used to solve the problems and examine the societal impact, including any legal ramifications involved pertaining to the case. The goal is to apply the science you have learned in the course to tackle problems involved in a murder case and how the science was instrumental/key to solving the case. Tests and final exam questions will be based on lecture material, case studies and videos discussed in class. Lectures will be posted weekly on Moodle. Regular attendance in lectures is imperative to get a passing mark in the course. Late assignments will be subject to a penalty of 20% per day. After 3 days the assignment will not be accepted and will be given a mark of zero.

**Policy on Missed Tests:** In the event of a missed test, the student is expected to provide a sick note from a registered Ontario physician within 48 hours. In the case of a serious calamity such as a death in the family, a note from the funeral director of the home or death certificate is acceptable. Students can come and discuss with me about this for clarification. The percentage of the missed component will be added toward the final. There will be no make up tests!

### **Evaluation:**

Online assignments (Ongoing- biweekly)	10%
i-Clickers ( Ongoing, weekly)	5%
Case studies (February 5th, in-class)	10%
Midterm Feb 28th	25 %
Report (Due March 12 <sup>th</sup> in class)	15%
Final exam April TBA	35%

### **Report Guidelines:**

1. Introduction/Rationale : In this introductory section, the student clearly identifies the forensic problem to be solved and includes a rationale indicating why the problem is of interest and relevance to the course. The problem should be in the spectrum of Forensic Science and may include topics in Forensic Chemistry, Forensic Anthropology, Forensic Psychology, Forensic Entomology, Forensic Biology, Toxicology, Pathology etc. It is **preferable** that students pick a topic based on the video/episodes shown in class, but this is not a requirement.
2. Science and Methods Used: The student presents the analysis of evidence using the scientific tools and science concepts discussed in the course.
3. Evaluation of the methods used: Are the results accurate and adequate? What are the limitations?

4. Societal Impacts and Legal Ramifications. Examples may include landmark findings such as the David Milgaard case, the case of Guy Paul Morin, Steven Truscott and Shaken Baby Syndrome.
5. Conclusion: students are expected to synthesize the material and summarize their findings in a logical, systematic manner..
6. Bibliography: This will be one page and should include the references cited. The reference citation should include the author, title, source and date of publication and correct page numbers. Use the same format for all the references cited for consistency. No more than 10 references need to be included.

The individual reports should be ~1,200-1700 words, double-spaced, have a title page, with titles and subtitles in the appropriate sections of the report. Reports that contain an excessive number of spelling and grammatical errors or inadequate number of footnotes will be accordingly penalized.

Evaluation will be based on how well all these elements are presented and on how well students marshal the forensic evidence and use the science they have learned in the course. A concise and clear writing style is especially critical.

Note that students are recommended to use a case from the videos shown in class for the report.

Examples of possible topics for a report may also include:

- The importance of Bite Mark evidence in the conviction of Ted Bundy - Forensic Odontology: Pivotal evidence at the trial matched a bite mark found on the left buttock of the murdered student, Lisa Levy, with the outline of Ted Bundy's front teeth.
- Forensic Entomology in Estimation of time of death. Plant and insect evidence can reveal the time of death and link a suspect to the crime scene.
- Tracing Explosives. Students will learn about oxidizing and reducing agents in chemistry and their role involved in explosions. A case example could be the bombing of Pan Am flight 103 in 1988, in which 270 people were killed.
- DNA- The Indispensable Forensic Tool. Blood and DNA analysis can positively identify a suspect. DNA and dental pattern records can be used to identify an identified corpse.

Quoting directly from research sources without proper acknowledgement is considered plagiarism and a deemed academic offence!

### ***Textbook and Resources***

***Required Text:*** *Criminalistics-An Introduction to Forensic Science*- Richard Saferstein, 11<sup>th</sup> Edition, Pearson Education, Inc. 2015. ISBN # 978-0-13-345882-4

This book is available as a bundle with my CJ lab at the York University Bookstore.

### ***Recommended Readings***

*Molecules of Murder-Criminal Molecules and Classic Cases*, John Emsley, 2008. RSC Publishing. ISBN# 978-0-85404-965-3

*Forensic Science*, Andrew Jackson & Julie Jackson, (2004). Pearson education Ltd. ISBN #0-13-043251-2

*Investigating Chemistry- Introductory Chemistry from a Forensic Science Perspective*, Fourth edition, Mathew Johll., W.H. Freeman and Company, 2019.