

# LOCALLY DEVELOPED COURSE OUTLINE

Forensic Science Studies35-5

Submitted By:

**Chinook's Edge School Division No. 73**

Submitted On:

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## Course Basic Information

<u>Outline Number</u>	<u>Hours</u>	<u>Start Date</u>	<u>End Date</u>	<u>Development Type</u>	<u>Proposal Type</u>	<u>Grades</u>
35-5	125.00	09/01/2016	08/31/2020	Acquired	Reauthorization	G10 G11 G12

### Acknowledgment

### Course Description

Advanced Forensic Science 35 is a distributed learning course that allows students to study scientific concepts and technologies related to solving crime in society in an anytime, anyplace, any pace model. Through the study of forensic science techniques, students are given the opportunity to explore and further understand how basic scientific concepts apply specifically to this unique field of study. This course encourages an engaging and interdisciplinary approach to learning that has been successful for many years at the Alberta Distance Learning Centre.

### Course Prerequisite

# Philosophy

The philosophical underpinnings of this course are based on the principals found in the *Inspiring Education* framework:

## **Learner Centred**

*“Decision makers should consider the needs of the children and youth first and foremost when making decisions.”*

Forensics 35□5 offers students throughout the province an opportunity to study science, sociology and psychology in a highly engaging manner. This course is a small step toward an integrated approach to learning that will serve the needs of the 21st Century Learner

## **Engaged Communities**

*Community resources should be fully engaged to support learners, including expertise, facilities, services and learning opportunities. Community resources□whether local, provincial, national or global□ should actively participate in the education of the learners.*

ADLC engaged the law enforcement community as it revised the general and specific outcomes for Forensics 35□5. The online Forensics 35□5 course will included many resources gleaned directly from the law enforcement and post□secondary communities to ensure the content is relevant and current and highly engaging.

## **Inclusive, Equitable Access**

*Every learner should have fair and reasonable access to educational opportunities regardless of ability, economic circumstance, location, or cultural background. Their needs and way of life should be respected and valued within an inclusive learning environment. Some learners will require additional, specialized supports to fully access those opportunities.*

Forensics 35□5 will be offered any time, any place, any pace. This course will support online and outreach programs throughout Alberta.

## **Responsive, Flexible Approach**

*“Children and youth should have meaningful learning opportunities appropriate to each learner’s developmental stage, including learning that is experimental, multi□disciplinary, community based, and self□paced. To ensure the learning opportunities are relevant, the education system must be nimble in responding to the changing needs of the community and the world.”*

Learning in this course will begin by the acquiring of the knowledge of basic scientific concepts that apply to forensic science. These scientific principles will then be applied and authenticated through the discussion of realistic scenarios and by engaging in concrete learning activities such as notes, worksheets, laboratory experiments, library/internet

research assignments, group mystery projects and the exploration of case study examples. Based on the principals of Universal Design for Learning, multiple formats of the course will be offered to students. Additional supports such as text to speech software and videos will be integrated into the Forensics 35□5 online course to support learners who struggle with text heavy content. Assessment will focus on allowing students to represent their learning through multiple means of expression. Forensics 35□5 will be a showcase for what is possible in digital learning environments

## **Rationale**

Rationale:

It has become evident that many students at the senior high level are interested in taking forensic science as an optional course. This course will allow students to learn more of this unique and growing field of scientific research.

The overall goals of this program are to:

- appreciate the value of forensic science in criminal investigations.
  
- provide students with a broadened prospective of the field of forensic science by exposing them to a variety of different types of forensic investigative techniques.
  
- apply and/or discuss forensic science techniques through laboratory experimentation, assignments, mystery projects and case study examples.

# Learner Outcomes

Forensic Science 35 will include the following areas of study:

## The Investigation Process

- appreciate the various roles that law enforcement officials play in various crime investigations
- appreciate the various roles that both police and civilians play in investigations involving forensic science
- understand what occurs in the court process for a serious crime investigation
- explain how evidence is presented in a court case for a serious crime investigation
- explore a historical crime case(s) that describes the involvement of the various levels of law enforcement

## Forensic Anthropology

- general description of forensic anthropology
- human bones vs. animal bone
- determining ancestry from skeletal remains
- skeletal differences between human females and males
- how various types of forces and trauma can damage bone

## Forensic Entomology

- general description of forensic entomology
- insect variation in environments
- general description of insect species involved in the colonization of dead remains
- general description of insect succession of dead remains
- determination of time of death by use of insect colonization
- research assignment and/or related video(s) and/or guest speaker and/or fieldtrip

- driving under the influence of drugs
- various types of toxicological testing techniques
- simulated toxicological testing experiment(s)
- poisons and their harmful side effects
- case study based investigation and/or research assignment and/or related video(s) and/or guest speaker and/or field trip

#### Forensic Ballistics

- general description of forensic ballistics
- internal, external and terminal ballistics
- description of various types of firearms
- velocity, kinetic energy and trajectory variations of firearms
- ballistic fingerprints
- testing for gunpowder/primer residue
- case study based investigation and/or research assignment and/or related video(s) and/or guest speaker and/or field trip

#### Police Protective Equipment

- importance of bullet resistant vests
- molecular structure of Kevlar
- description and practical use of the taser gun
- description and practical use of pepper spray
- molecular ingredients of pepper spray

- description and practical use of tear gas
  - molecular ingredients of tear gas
  - case study based investigation and/or research assignment and/or related video(s) and/or guest speaker and/or field trip
- Forensic Analysis of Footprint & Tire Impressions

- general description of forensic analysis of footprint & tire impressions
  - collection and preservation of footwear and tire impressions
  - interpretation of footprint impressions
  - interpretation of tire impressions
  - footprint and tire databases
  - case study based investigation and/or research assignment and/or related video(s) and/or guest speaker and/or field trip
- Criminal Profiling

- general description of criminal profiling
- historical background of criminal profiling
- necessity of criminal profiling
- steps involved in creating a criminal profile
- disorganized offender vs. organized offender
- description of a criminal profile report
- creation of mock criminal profile
- description of geographic profiling
- creation of a mock geographic profile

- case study based investigation and/or research assignment and/or related video(s) and/or guest speaker and/or field trip

#### Arson and Explosive Detection

- chemical description of combustion reaction
- combustion vs. explosion
- basic arson terminology
- three conditions of a fire
- general description of the crime of arson
- types of arson
- motivation for arson
- arson investigative process
- arson investigation tools and methods
- arson related injuries and fatalities
- arson fires in residences vs. apartment and/or vehicles
- basic components of an explosive device
- explosive detection devices or techniques
- explosives in warfare

- case study based investigation and/or research assignment and/or related video(s) and/or guest speaker and/or field trip

#### Law Enforcement Canines

- value of law enforcement canines



- historical background of the use law enforcement canines
- description of various types of law enforcement canines
- common breeds used
- case study based investigation and/or research assignment and/or related video(s) and/or guest speaker and/or field trip

## **General Outcomes**

- 1 Students will appreciate the value of forensic science in criminal investigations.**
- 2 Students will acknowledge that various scientific disciplines such as biology, chemistry and physics are involved in the field of forensic science.**
- 3 Students will develop a basic understanding of the fundamental forensic science techniques.**
- 4 Students will recognize the history of the field of forensic science and that it continues to expand and be refined.**
- 5 Students will acknowledge that forensic scientific evidence is not 100% accurate due to human error in the collection and interpretation/assessment of evidence.**
- 6 Students will appreciate the experience of forensic science/crime investigation experts discussing their area of expertise.**

## Specific Learner Outcomes

<b>1 Students will appreciate the value of forensic science in criminal investigations.</b>	<b>35-5</b>
1.1 Appreciate how an emergency call turns into a forensic investigation	X
1.2 Understand and explain the many different kinds of forensic jobs and how they are involved in criminal investigations.	X
1.3 Analyze and summarize available avenues to enter the field of forensics and explain the importance of the education required for various jobs in the forensics field.	X
1.4 Understand and explain the use of forensics in Forestry and Wildlife and the different jobs available.	X
1.5 Understand and explain the role and duties of an Identification Unit officer, and the Medical Examiner in a criminal investigation.	X
1.6 Understand and explain the process of and how forensics are involved in the trial and prosecution of a suspect.	X
1.7 Analyze and summarize the Canadian Charter of Rights and Freedoms and describe how it relates to investigative processes and criminal trials.	X
1.8 Understand and explain the importance of photographic evidence and dental evidence in a criminal trial.	X
1.9 Understand and explain how the field of forensic anthropology provides information about the victim of a crime and the nature of the crime itself from unknown skeletal remains.	X
1.10 Understand and explain how the field of forensic entomology provides information about the approximate length of time that a victim's body has been left in an area based upon insect infestation.	X
1.11 Understand and explain how the field of forensic toxicology helps investigators to identify various types of drug(s) and/or poison(s) found within an individual's system.	X

1.12 Explain the importance of a comprehensive national or global 'ballistic fingerprint' data bank and propose the positive and negative implications of having such a data bank.	X
1.13 Understand and explain the use of shoe impressions, tire tread impressions and tool marks in a criminal investigation and the importance of shoe and tire impression databases	X
1.14 Understand and explain the value that criminal profiling and geographic profiling serves in criminal investigations.	X
1.15 Analyze and summarize the value of police canines in criminal investigations.	X

<b>2 Students will acknowledge that various scientific disciplines such as biology, chemistry and physics are involved in the field of forensic science.</b>	<b>35-5</b>
2.1 Analyze and summarize basic human anatomy, the basic skeletal differences between human and animal bones, the basic skeletal differences between humans from different ancestries, the basic skeletal differences between male and female remains and the differences in size and length of various bones between female and male remains.	X
2.2 Understand and explain how each environment has a unique set of native insect species and how each of these insects has a unique life cycle and exhibits unique behaviors.	X
2.3 Understand and explain how common poisons affect specific components of the human anatomy.	X
2.4 Analyze and summarize what velocity, kinetic energy, gravitational potential energy and trajectory are and explain the importance of the relationship between these entomology.	X
2.5 Analyze and summarize graphed data regarding the average velocity of handgun, rifle and shotgun rounds, average kinetic energy of handgun, rifle and shotgun rounds and the average trajectory of handgun, rifle and shotgun rounds.	X
2.6 Analyze and summarize the energy conversions of a bullet-proof vest.	X
2.7 Understand and explain the physiology of nerves, nerve impulses and lactic acid to better understand the effects of a CED gun.	X

2.8 Understand and explain the difference between current and voltage to better understand the safety features of a CED gun.	X
2.9 Understand and explain the structure and function of the eye to better understand the effects of pepper spray.	X
2.10 Understand and explain the components necessary for a combustion reaction, an oxidization reaction and a limiting factor reaction and explain the effects of the different components.	X
2.11 Understand and explain how combustion differs from an explosion.	X

<b>3 Students will develop a basic understanding of the fundamental forensic science techniques.</b>	<b>35-5</b>
3.1 Analyze the legal and environmental ramifications of poaching and illegal logging as well as the investigative and forensic processes used to investigate illegal logging, poaching and animal trafficking.	X
3.2 Investigate how crime labs funded by the government differ from crime labs that are privately funded.	X
3.3 Analyze the basic processes followed in the collection and documentation of evidence.	X
3.4 Identify the processes used to analyze forensic evidence, the length of time needed to complete the analysis and appreciate that most forensic analysis is completed in a crime lab by the identification unit or by experts outside the police agency.	X
3.5 Appreciate the role of the polygraph unit detectives in homicide investigations.	X
3.6 Analyze and summarize the autopsy process.	X
3.7 Identify the types of evidence and information in a homicide file.	X
3.8 Investigate how a forensic anthropologist assesses human and non-human skeletal remains for gender, time of death, ancestry of individual, stature of the individual (or individuals), as well as the cause of death.	X

3.9 Explore how trauma, various forces, and types of weapons cause damage to bone.	X
3.10 Analyze how dental marks are collected and analyzed and explain how records are used to identify bodies.	X
3.11 Summarize how the approximate time of death of victims can be found through the description of insect colonization found upon the remains.	X
3.12 Investigate the effects of poisons and illegal drugs on the human body including the dangers of driving a motor vehicle while under the influence of drugs.	X
3.13 Appreciate the need for roadside drug testing devices used by law enforcement.	X
3.14 Analyze the steps in the acid-base extraction including the procedures used in extracting drugs, poisons, and toxins from the body.	X
3.15 Explain how toxicological testing techniques are used to identify drugs and poisons in the human body.	X
3.16 Investigate firearm forensics including the categories of forensic ballistics (projectile motion), bullet design, bullet-gun matching, wound creation, and techniques used to determine if a suspect has fired a gun.	X
3.17 Explore the techniques used to determine if a suspect has fired a gun.	X
3.18 Analyze the function and use of Conducted Energy Device (Tasers), tear gas, and pepper spray by law enforcement as well as their effects on the human body.	X
3.19 Summarize how shoe impressions, tire impressions and tool mark impressions are created, collected, preserved, and analyzed.	X
3.20 Analyze the basic psychology used in criminal profiling and summarize how experts determine what to include in a profile and decide if mental illnesses play a role in the suspect's behaviour.	X
3.21 Compare the traits of an organized offender with a disorganized offender and assess studies to determine if a criminal suspect is organized, disorganized or a combination offender.	X

3.22 Describe the three points and conditions of a fire and evaluate the effects of various accelerants, blasts, boosters, detonations, endothermic/exothermic reactions, fuel types, ignition sources, pyrolysis, and oxidizers on fires.	X
3.23 Identify the level of oxygen needed to keep a fire burning as well as the products produced by a combustion reaction that can cause a fire to continue.	X
3.24 Explore statistics on arson, including arson type and location, motives for arson, fatalities linked to arson, and possible prevention strategies.	X
3.25 Describe the methods used to determine if a fire is caused by an arsonist and analyze the processes used to extract accelerants.	X
3.26 Investigate types of explosive devices, the techniques used to detect them and summarize the three basic components of an explosive device.	X
3.27 Appreciate the role of canines in law enforcement and detail the training of type of canine.	X

<b>4 Students will recognize the history of the field of forensic science and that it continues to expand and be refined.</b>	<b>35-5</b>
4.1 Analyze and summarize the history of the development of bullet resistant vests.	X
4.2 Analyze and summarize the history of criminal profiling and geographic profiling.	X
4.3 Explain the importance of the first use of police canines in history; outline the most common dog breeds that are used for law enforcement and the significant traits of these breeds.	X

<b>5 Students will acknowledge that forensic scientific evidence is not 100% accurate due to human error in the collection and interpretation/assessment of evidence.</b>	<b>35-5</b>
5.1 Understand and explain the difference between screen tests and confirmation tests as well as why each is needed.	X

5.2 Compare and demonstrate a match of example shoe impressions with prepared shoe impressions, tire tread impressions with prepared tire tread impressions and tool mark impressions with prepared tool mark impressions.	X
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<b>6 Students will appreciate the experience of forensic science/crime investigation experts discussing their area of expertise.</b>	<b>35-5</b>
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6.1 Appreciate different accounts from experts in the field of forensics about how they entered the field.	X
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## Facilities or Equipment

### Facility

There are no special facilities or spaces required to teach this course. A standard classroom is a suitable setting in which to teach this course.

#### Facilities:

### Equipment

No additional equipment is required beyond that which is generally found in a standard classroom.

# Learning Resources

Students registered with the Alberta Distance Learning Centre will be provided with the following materials including:

1. Print – content via five coil booklets
    - assessments via twelve assignment booklets
  2. Online – content via either Desire 2 Learn or Moodle
    - assessments via online quizzes
- Other school divisions will create and provide their own learning resources that may or may not include these listed.

## Others

### **Sensitive and Controversial Content**

It is expected that all issues and texts that may be controversial or sensitive be discussed with the school administration prior to their coverage in class.

Guiding principles for dealing with sensitive and controversial issues are outlined in Chinook's Edge Policy 2-09 *Teaching About Controversial Issues*.

### **Mitigation Strategies**



## **Safety Components**

All Chinook's Edge safety procedures will be followed during classroom instruction, in accordance with Chinook's Edge Administrative Procedure 4-19 *Health & Safety*.

If students are taken off campus, all Chinook's Edge procedures pertaining to planning, parental permission, risk assessment, etc., will be followed in accordance with Chinook's Edge Administrative Procedure 2-09 *Field Trips - Planning & Requirements*.

## **Mitigation Strategies**

## **Significant Overlap with Provincial Curriculum**

No overlap has been identified.

# Assessment

Course Evaluation:

Students will be assessed and evaluated through a variety of forms such as...

Suggested daily in-class assignments – (emphasis 50%)

- Worksheets
- Internet research assignments
- Case studies
- Mystery projects
- Laboratory activities
- Quizzes

Suggested Final Assessment - (emphasis 50%)

- Crime Novel Project
- Cumulative Exam
- Cumulative Mystery Project(s)

## **Course Evaluation and Monitoring**

The Associate Superintendent Learning Services, in collaboration with the school Principal, will evaluate and monitor this course to ensure that all requirements (by Alberta Education, by the developing school board, and by Chinook's Edge) are met. The school Principal will supervise the course implementation at the school level.

Course prerequisites, copyright privileges, and conditions listed by the developing board will be adhered to.

## **Appendix I**

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