



COURSE CURRICULUM

Course Title: ADVANCED FORENSIC EXPLOSIVES

Course Code: FSIC 713

Credit Units: 3

Course Level: PG

L	T	P/S	SW/F W	TOTAL CREDIT UNITS
3	0	0	0	3

Course Objectives: This course will cover:

- An understanding of forensic ballistics and its scope in forensic science
- Types of explosives used in criminal activities
- Different types of explosives and their examination

Pre-requisites: Basic knowledge of chemistry.

Course Contents/Syllabus:

	Weightage (%)
Module I : Development & Classification of Explosives	
Descriptors/Topics Development of black powder, nitroglycerine, mercury fulminate, nitrocellulose, dynamite, ammonium nitrate, ANFO. Development of military explosives: picric acid, tetryl, TNT, PETN, RDX and HMX. Primary explosives: lead azide, lead styphnate, mercury fulminate, tetrazene. Secondary explosives: TNT, RDX, PETN, Tetryl, Gelatines, powders, ANFO, emulsion slurries. Introduction, plain and electric detonators, delay detonators, detonating and safety fuse, high explosive mixtures.	20
Module II : Location, Collection and Examination of Explosive Residue	
Descriptors/Topics Location and collection of fireworks, military explosives, homemade bombs, booby traps and letter bombs. Disposal of an explosive device, dispatch of explosive device and exploded material. Chromatographic techniques: TLC, HPLC, Ion chromatography. Mass spectrometry, chemical examination.	20
Module III : Assessment and Thermochemistry of Explosives	
Descriptors/Topics Sensitiveness test, determination of explosive power, thermochemistry of explosives, oxygen balance, heat of explosion, effect of oxygen balance, explosive power and power index, temperature of chemical explosion.	20
Module IV : Detection of Hidden Explosives	20

Descriptors/Topics Vapor detection method: trained animals, adsorption and preconcentration of explosive vapors, ion mobility spectrometry, bioluminescence. X-ray imaging, energetic photons detection, thermal neutron activation, fast neutron technique.	
Module V : Instrumental Techniques in Explosive Residue Analysis	20
Descriptors/Topics Chromatographic techniques: TLC, HPLC, Ion chromatography. Mass spectrometry, chemical examination.	

Student Learning Outcomes: On completion of this course, the student will be able to:

- **examine** the evidences and the thermo-chemistry of explosives
- **distinguish** between explosives and their properties using various chemical and instrumental methods.
- **analyse** various explosives residues

Pedagogy for Course Delivery:

The course will be taught in active-learning mode, incorporating both lectures and tutorials, along with class presentations, general discussions, and interactions.

Lab/ Practicals details, if applicable: NA

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total (%)
100	0	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment				End Term Examination
Components (Drop down)	A	H	CT	
Weightage (%)	5	10	15	70

Text Reading & References:

- Boudreau, JE et al – Arson & Arson Investigation, Surevey & Assessment National Institute of Law Enforcement, U.S Deppt of Justice, US Govt. Printing Press (1977)
- D.A. Skoog, D.M. West and F.J. Holler; Analytical Chemistry: An Introductin; Saunders College Publishing, Philadephia, USA, (1994)
- Dettean, J D; Kirk’s Fire Investigation, 5th ed, Prentice Hall, Eaglewood Cliffs, N.J (2002)
- Working Procedure Manual: Chemistry, Explosives and Narcotics, BPR&D Pub (2000)
- Y. Lyalikov; Physiochemical Analysis; Mir, Moscow, USSR, (1968)