Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari Science College
Semester-5 (B.Sc)

Subject: Arson and Accidental Analysis - BSCFS15309

Type of course: Minor

Prerequisite: Basic understanding of fire chemistry and motor vehicles.

Rationale: This course covers basic fire chemistry, arson and their cases and various types of accidents investigations. Students will learn the types of burn cases and sections related to various types of motor vehicle accidents.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				ESE		CCE			
CI	T	P	C	Theory	Practical	MSE	LWA/V	ALA	
4	0	0	4	100	00	30	00	70	200

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; SEE - Semester End Evaluation; MSE- Mid Semester Examination; LWA - Lab Work Assessment; V – Viva voce; CCE-Continuous and Comprehensive Evaluation; ALA- Active Learning Activities.

4 Credits * 25 Marks = 75 Marks (each credit carries 25 Marks) Theory
SEE 100 Marks will be converted in to 50 Marks
CCE 100 Marks will be converted in to 50 Marks

Course Content:

Unit No	Course Content	Hrs	% Weightage
1	**Introduction to Fire and Arson Investigation:** Introduction to arson, motive, chemistry of fire, fire scene investigation, fore investigator safety, fire scene hazards, investigators priorities upon arrival at scene, scene security, fire	15	25%

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	scene examination: backwards theory, determination of point of origin, reconstruction, fire cause; documentation and photography.		
2	**Collection and preservation of fire evidence-** introduction, evidence, cross contamination, tools, evidence containers, chain of custody, types of evidences, comparison samples, transportation of evidence, evidence collection techniques, sampling techniques, extraction of exhibit, GC and capillary GC.	15	25%
3	**Accident Analysis**–introduction , causes of road accidents: related to driver, road conditions, vehicle, traffic lights and signals, related to victim; investigation of traffic collision, sources of physical evidences, collection and evaluation of physical evidences, skid marks, speed, extent of vehicle damage.	15	25%
4	**Transportation injuries-** Automobile accidents: injuries to pedestrian, vehicle occupants; airbag injuries, deceleration injuries, seat belt syndrome, under running, ejection injury, medico legal importance: motor cycle accidents, bicycle accidents; sections in law related to accidents	15	25%

Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1	**Burn Pattern Detectives** Provide diagrams of different burn patterns (e.g., V-patterns, circular patterns) and scenarios. Students analyze and annotate the diagrams to identify the fire's point of origin and upload it on GMIU web Portal.	10
2	**Fuel or Foul Play** Provide descriptions of accelerants and ignition materials found at a scene. Students match the materials to potential causes (e.g., arson vs accidental ignition) and upload it on GMIU web Portal.	10
3	**Crash Scene Chronicles** Provide students with a diagram of a vehicle accident scene, including skid marks, collision points, and debris locations. They analyze the diagram to reconstruct the events leading to the crash and upload it on GMIU web Portal.	10

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4	**Hazard Hunt** Provide a workplace or household accident scenario on paper (e.g., spilled liquids, frayed wires). Students identify potential hazards and suggest preventive measures and upload it on GMIU web Portal.	10
5	**Chemical testing of accelerants** Students will be provided with different liquids(alcohol, kerosene, water) and they have to conduct simple chemical tests(ignition test or chromatography) and upload the images with result on GMIU web portal.	10
6	**Evidence collection and preservation** Students will get a mock-fire damaged crime scene with debris, charred samples and suspected accelerants. They will collect evidence(ash, burnt remains) and do the packaging along with forwarding report and upload the image on GMIU web portal.	10
7	**Attendance**	10
Total		70

Suggested Specification table with Marks (Theory):75

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	30%	40%	30%	00	00	00

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Explore the foundational principles and processes involved in fire and combustion phenomena.
CO2	Examine vehicle maintenance, safety features, and their role in accident investigations.
CO3	Conduct hit-and-run investigations by analyzing trace evidence and site-specific details.
CO4	Assess the accuracy of speed records and identify potential discrepancies.

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Instructional Method:

The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
From the content 10% topics are suggested for flipped mode instruction.
Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory
The internal evaluation will be done on the basis of Active Learning Assignment
Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in laboratory.

Reference Books:

[1] T.S. Ferry, Modern Accident Investigation and Analysis, Wiley, New York (1988).
[2] D. Lowe, The Tachograph, 2nd Edition, Kogan Page, London (1989).
[3] T.L. Bohan and A.C. Damask, Forensic Accident Investigation: Motor Vehicles, Michie Butterworth, Charlottesville (1995).
[4] S.C. Batterman and S.D. Batterman in Encyclopedia of Forensic Sciences, Volume 1, J.A. Siegel, P.J. Saukko and G.C. Knupfer (Eds.), Academic Press, London (2000).

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