FORENSIC SCIENCE

DEPARTMENT OF CHEMISTRY
UNIVERSITY COLLEGE OF SCIENCE
OSMANIA UNIVERSITY
HYDERABAD

LESSON PLANS
FOR THE ACADEMIC YEAR
2022-2023

M.Sc. FORENSIC SCIENCE
Semester I

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I

Course/Paper: I/FS 101T (Criminal Justice System and Forensic Science)

Unit I: Introduction to Forensic science and criminal Investigation

No. of Hours Allotted: 15

Name of the Teacher: **Dr. K. Rama**

Lecture No.	Topics to be covered
1	Introduction and History of Forensic Science
2	Organization of Forensic Science Laboratories and other allied institutions
3	Duties and role of Forensic Scientists
4	Physical evidence (Types and Classification), Locard's exchange principle
5	Role of Forensic Science in crime investigation with examples
6	Introduction and types of Crime scene
7	Processing of crime Scene
8	Probative value of physical evidence and Chain of custody
9	Reconstruction of scene of crime
10	Investigation of crime
11	Modus operandi
12	Introduction to courtroom testimony
13	Admissibility of expert testimony
14	Expert and lay witnesses
15	Giving testimony as an Expert

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: I/FS 101T (Criminal Justice System and Forensic Science)
Unit II: Sociology, Criminology and Penology

No. of Hours Allotted: 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Introduction to Society , Culture and socialization
2	Social problems in India
3	Social change
4	Sociological causes of crime
5	Relation of sociology to other sciences
6	Introduction to Criminology
7	Types and causes of crimes
8	Schools of Criminology
9	Juvenile delinquency and Criminal profiling
10	Introduction to penology
11	Theories of punishments
12	Types of punishments
13	Capital punishment
14	Administration , Functioning and limitations of prisons and correctional institutions
15	Objectives of prisons and correctional institutions

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: I/FS 101T (Criminal Justice System and Forensic Science)
Unit III: Forensic Psychology

No. of Hours Allotted: 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Introduction, Scope, importance and Principles of development Forensic Psychology
2	Attention and perception
3	Process of learning
4	Memory and forgetting
5	Motivation
6	Attitudes
7	Values of emotions
8	Behavioural problems
9	Conflict and use of defense mechanisms
10	Various types of mental disorders
11	Psychology of criminal behaviour
12	Forensic Psychology and Psychiatry
13	Narcoanalysis
14	Polygraphy
15	Brain fingerprinting

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I

Course/Paper: I/FS 101T (Criminal Justice System and Forensic Science)

Unit IV: Criminal justice system and law

No. of Hours Allotted: 15

Name of the Teacher: **Prof. B. Vijayalaxmi**

Lecture No.	Topics to be covered
1	Introduction and Administration of civil and criminal justice
2	Hierarchy, Powers and Types of courts
3	Lok Ayukta system
4	The structure of Police organizations in India
5	Functions and duties of police
6	Investigation of crimes and prosecution
7	Cognizable and Non- cognizable offences
8	Powers of police to search, seize and arrest
9	Role and responsibilities of prosecution
10	Third degree methods and Human rights
11	Scientific methods of investigation
12	Sections of Indian penal code (171B, 171E, 291, 292, 293, 299, 300, 302, 304B)
13	Sections of Indian penal code (308, 309, 362, 375, 376, 390, 391, 415, 420, 463, 465)
14	Sections of criminal procedure code (291, 292, 293, 300)
15	Sections of Indian evidence act (45, 46, 47, 57, 58, 60, 73, 135, 136, 137 and 159)

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I

Course/Paper: II/FS 102T (Analytical Chemistry)

Unit I: Introduction to Analytical Chemistry

No. of Hours Allotted: 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Nature and scope of analytical chemistry
2	Classification of analytical methods
3	Conventional and instrumental methods of analysis
4	Theoretical principles of analytical chemistry
5	Law of mass action and its application – Le Chatelier and Braun principle
6	Van't Hoff reaction isotherm – Dissociation theory – Electrolytes and non-electrolytes –
7	Classification of acids, bases and salts according to their degree of dissociation – Dissociation of acids, bases and salts –
8	Dissociation constants – Common ion effect – Solubility product
9	Diverse ion effect – Ionization of water – pH value – pOH value
10	Relation between pOH & pH scale – pH scale -
11	Salt hydrolysis
12	Degree of hydrolysis and hydrolysis constant
13	Buffer solutions - Buffer action - Calculation of pH of a buffer solution
14	Preparation of buffer solutions
15	Completeness of a chemical reaction

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I

Course/Paper: II/FS 102T (Analytical Chemistry)

Unit II: Inorganic and organic analysis

No. of Hours Allotted: 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Organic reagents in detection of inorganic ions
2	Oxidizing and reducing agents in organic chemistry
3	Inorganic and organic spot tests
4	Micro chemical tests
5	Physical tests – Qualitative inorganic analysis
6	Group separations for cations and anions
7	Interfering radicals
8	Elemental analysis of organic compounds – Functional group analysis
9	Schemes of identification of unknown solids, liquids and gases (inorganic and organic)
10	Confirmation tests and their importance – Sensitivity and limit of detection
11	Alternative methods of analysis
12	Physical separation methods
13	Distillation – Extraction
14	Precipitation, Crystallization
15	Chromatographic methods

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: II/FS 102T (Analytical Chemistry)
Unit III: Volumetric analysis

No. of Hours Allotted: 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Volumetric / Titrimetric methods of analysis
2	General principle – Equivalence point and end point
3	Fundamental requirement of a titrimetric method
4	Standard solution
5	Detection of end point – Indirect titrations
6	Types of reactions
7	Calculations in titrimetry
8	Aqueous acid-base titrimetry
9	Acids and bases – Preparation of standard solutions
10	Primary standards – Indicators – Theory of indicators
11	Strong acid-strong base; weak acid-strong base; weak base-strong acid and weak acid-weak base titrations
12	Acid-base titrimetry in nonaqueous solvents – Redox titrimetry – Oxidation and reduction
13	Oxidant and reductant – Iodimetry and iodometry –
14	Permanganometry – Dichromatometry
15	Precipitation methods – Argentometry – Complexometry – EDTA methods

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: II/FS 102T (Analytical Chemistry)
Unit IV: Gravimetric analysis

No. of Hours Allotted: 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Gravimetric methods of analysis
2	Basic Digestion of precipitates – Washing of precipitates
3	Drying and ignition of precipitates
4	Thermal decomposition of precipitates – Organic precipitants
5	Determination of chloride, sulphate, iron, calcium and nickel as examples
6	Principles – Factors affecting gravimetric analysis
7	Requirements of quantitative separation
8	The process of precipitation
9	Saturated and supersaturated solution
10	Nucleation – Crystal growth
11	Conditions of precipitation, Completeness of precipitation
12	Factors influencing solubility
13	Purity of a precipitate
14	Adsorption of ions on precipitates – Co precipitation
15	Occlusion and post-precipitation

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I

Course/Paper: III/ FS 103T (Instrumental Methods of Analysis – I)

Unit I: Atomic spectroscopy

No. of Hours Allotted: 15

Name of the Teacher: **Dr. Raju Jannapureddy**

Lecture No.	Topics to be covered
1	General properties of Electromagnetic Radiation
2	Wave and quantum mechanical properties of radiation
3	Optical Atomic Spectra
4	Principles and instrumentation of Atomic Absorption Spectrometry
5	Techniques and forensic applications of Atomic Absorption Spectrometry
6	Principles and instrumentation of Atomic Fluorescence Spectrometry
7	Techniques and forensic applications of Atomic Fluorescence Spectrometry
8	Principles and instrumentation of Atomic Emission Spectrometry
9	Techniques and forensic applications of Atomic Emission Spectrometry
10	Principles and instrumentation of Atomic Mass Spectrometry
11	Techniques and forensic applications of Atomic Mass Spectrometry
12	Principles and instrumentation of Atomic X-Ray Spectrometry
13	Techniques and forensic applications of Atomic X-Ray Spectrometry
14	Interpretation of data
15	Interpretation of data

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I

Course/Paper: III/ FS 103T (Instrumental Methods of Analysis – I)

Unit II: Molecular spectroscopy

No. of Hours Allotted: 15

Name of the Teacher: **Dr. Raju Jannapureddy**

Lecture No.	Topics to be covered
1	Introduction to UV-Visible Molecular Absorption Spectrometry
2	Measurement of Transmittance and Absorbance
3	Beer's Law
4	Instrumentation of UV- Visible Molecular Absorption Spectrometry
5	Molar Absorptivities
6	Absorbing Species
7	Application to Qualitative Analysis
8	Application to Quantitative Analysis
9	Photometric Titrations
10	Photo acoustic Spectroscopy
11	Molecular Luminescence Spectrometry
12	Theory of Fluorescence and Phosphorescence
13	Instrumentation for Fluorescence and Phosphorescence Measurements
14	Applications of Photoluminescence methods
15	Chemiluminescence

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I

Course/Paper: III/ FS 103T (Instrumental Methods of Analysis – I)

Unit III: IR spectroscopy, NMR spectroscopy and Raman spectroscopy

No. of Hours Allotted: 15

Name of the Teacher: **Dr. Raju Jannapureddy**

Lecture No.	Topics to be covered
1	Infrared Spectrometry – Theory
2	Infrared Sources and Transducers
3	Instrumentation of IR Spectrometry
4	Dispersive and FT instruments
5	Techniques and Applications of Mid IR Absorption Spectrometry
6	Techniques and Applications of Mid IR Reflection Spectrometry
7	Techniques and Applications of Photo acoustic IR Spectrometry
8	Near and Far IR Spectrometry
9	IR Micro spectrometry
10	Forensic Applications of IR Spectrometric methods
11	Principles and Instrumentation of Raman Spectroscopy
12	Techniques and Applications of Raman Spectroscopy
13	Principles and Instrumentation of NMR Spectroscopy
14	Techniques and Applications of NMR Spectroscopy
15	Forensic Applications of NMR Spectroscopy

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: III/ FS 103T (Instrumental Methods of Analysis – I)
Unit IV: Electrochemical and Other instrumental methods **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. Someshwar Pola**

Lecture No.	Topics to be covered
1	Introduction and Principles of potentiometry
2	Instrumentation, techniques and applications of potentiometry
3	Introduction and Principles of coulometry
4	Instrumentation, techniques and applications of coulometry
5	Introduction and Principles of polarography
6	Instrumentation, techniques and applications of polarography
7	Introduction and Principles of ion selective electrodes
8	Instrumentation, techniques and applications of ion selective electrodes
9	Introduction and Principles of Thermo gravimetric Methods
10	Instrumentation, techniques and applications of Thermo gravimetric Methods
11	Radiochemical Methods and Radioactive Isotopes
12	Introduction and Principles of Neutron Activation Analysis and Isotope Dilution Methods
13	Instrumentation, techniques and applications of Neutron Activation Analysis and Isotope Dilution Methods
14	Introduction and Principles of X-Ray diffractometry
15	Instrumentation, techniques and applications of X-Ray diffractometry

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: IV/FS 104T (Computer Basis and Cyber Crime)
Unit I: Introduction to computers **No. of Hours Allotted:** 15

Name of the Teacher: **Mr. Ch. Eswara Sai Prasad**

Lecture No.	Topics to be covered
1	Introduction to computers – Applications of computers in science, engineering, technology and communication – Applications of computers in forensic science
2	The computer system and CPU – Types of computers (Corporate, departmental, desk top, lap top & personal computers)
3	The foundations of modern information technology
4	Binary numbers, digital signals, Moore's law, bits & bytes
5	The binary code, CPU, the microprocessor, the part of progress
6	Memory – ROM and RAM - Virtual memory
7	Caches – Buffers – Machine cycle – Registers
8	Buses for input and output – Adapter cards and multimedia systems
9	Computer ports – USC and fire wire input and output devices
10	Key board – Mouse – OCR bar codes
11	Speech recognition graphics – Scanners – Photoshop
12	Digitalizing photos and video pointing devices
13	Pixels and resolution fonts
14	Range of colour display screens – Types of resolution printers (Laser, dot matrix and ink jet, photo, colour & thermal)
15	Concepts of hard ware and soft ware

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: IV/FS 104T (Computer Basis and Cyber Crime)
Unit II: Basics of operating system and networking **No. of Hours Allotted:** 15

Name of the Teacher: **Mr. Ch. Eswara Sai Prasad**

Lecture No.	Topics to be covered
1	Secondary storage devices – Storage devices and media
2	Storage characteristics
3	Tracks and sectors
4	Storage media – Floppy disks,
5	HDD, optical discs, CDs, pen drives
6	Increasing data storage capacity
7	Back up smart card – The software
8	Introduction – OS – Application programme user interface
9	OS types - File management
10	Utilities – Document centric computing
11	Object linking and embedding (ole)
12	Major software issues – Network computing
13	Windows – Word processing – Desk top publishing
14	Power point presentation – Entering and editing documents –
15	Formatting documents – Spread sheet and data base applications – Internet browsing

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: IV/FS 104T (Computer Basis and Cyber Crime)
Unit III: Introduction to cyber forensics **No. of Hours Allotted:** 15

Name of the Teacher: **Mr. Ch. Eswara Sai Prasad**

Lecture No.	Topics to be covered
1	Introduction to Cyber Forensics
2	Storage fundamentals
3	File systems concepts
4	Data recovery – Cyber Forensic Investigation
5	Investigation tools – eDiscovery
6	Digital evidence collection – Evidence presentation
7	E-mail investigation – E-mail tracking – IP tracking
8	E-mail recovery – Encryption and decryption methods
9	Search and seizure of computers
10	Recovering deleted evidence – Password cracking
11	Formatted partition recovery
12	Data recovery tools
13	Data recovery procedures and ethics
14	Preservation and safe handling of the original media – .
15	Chain of custody

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: IV/FS 104T (Computer Basis and Cyber Crime)
Unit IV: Cyber law and cyber security **No. of Hours Allotted:** 15

Name of the Teacher: **Mr. Ch. Eswara Sai Prasad**

Lecture No.	Topics to be covered
1	Complete time line analysis of computer files based on file creation
2	File modification and file access
3	Recovery of internet usage data – Recovery of swap files / temporary files / cache files
4	Introduction to encase Forensic Edition
5	Forensic Tool Kit
6	Internet – Hacking – Cracking
7	Viruses – Virus attacks - Mail Bombs – Bug Exploits – Pornography
8	Software piracy – Intellectual property – Legal systems of Information Technology
9	Cybercrime laws – IT laws
10	Cyber security – Implementing hardware based security
11	Software based Fire walls – Security standards
12	Assessing threat levels – Forming an incident response team – Reporting cyber crime
13	Operating system attacks – Application attacks – Reverse Engineering
14	Cracking techniques – Financial frauds
15	Forensic accounting

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: I/ FS151P (Crime scene Management Lab)
No. of Sessions Allotted: 15 (4 hours each)

Name of the Teacher: **Dr. T. Sowmyya**
Mr. M. Mahesh

Session No.	Topics to be covered
1	Arriving and securing of outdoor crime scene
2	Arriving and securing of indoor crime scene
3	Sketching of Outdoor crime scene
4	Sketching of indoor crime scene
5	Photography of Outdoor crime scene
6	Photography of indoor crime scene
7	Collection and packing of physical evidence at the outdoor scene of crime
8	Collection and packing of physical evidence at the indoor scene of crime
9	Forwarding of physical evidence of indoor crime scene
10	Forwarding of physical evidence of outdoor crime scene
11	Reconstruction and evaluation of indoor crime scene
12	Reconstruction and evaluation of outdoor crime scene
13	Physical evidence and Locard's principle
14	Crime scene Kit Demonstration
15	Polygraphy (Demonstration only)

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: II/ FS152P (Analytical Chemistry Lab)
No. of Sessions Allotted: 15 (6 hours each)

Name of the Teacher: **Dr. T. Sowmyya**
Dr. Raju Jannapureddy

Session No.	Topics to be covered
1	Qualitative analysis of Lead, Arsenic ions in compounds
2	Qualitative analysis of Chromium, Zinc ions in compounds
3	Qualitative analysis of Selenium, Thallium ions in compounds
4	Qualitative analysis of Cyanide, Thiocyanate ions in compounds
5	Qualitative analysis of Phosphate, Chlorate, Perchlorate ions in compounds
6	Detection of nitrogenous functional groups in organic compounds
7	Detection of non-nitrogenous functional groups in organic compounds
8	Partition coefficient of benzoic acid between benzene and water
9	Determination of sodium carbonate and sodium bicarbonate in a mixture with standard HCl
10	Determination of purity of potassium /sodium nitrite by Permanganometry
11	Estimation of ferric iron in ferric alum by dichromatometry
12	Estimation of lead by iodimetry
13	Estimation of calcium and magnesium by EDTA Complexometry
14	Preparation of buffer mixtures and measurement of pH
15	Study of hydrolysis of an ester catalysed by an acid

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester I)

Class: M.Sc. Forensic Science **Section:** Semester I
Course/Paper: III/ FS153P (Instrumental Methods of Analysis Lab)
No. of Sessions Allotted: 15 (6 hours each)

Name of the Teacher: **Mr. B. Rajesh**
Mr. M. Mahesh

Session No.	Topics to be covered
1	Verification of Beer's law and calculation of molar absorption coefficients for CuSO4
2	Verification of Beer's law and calculation of molar absorption coefficients for KMnO4
3	Estimation of salicylic acid by colorimetry
4	Conductometric titration of strong acid vs. strong base
5	Conductometric titration of weak acid vs. strong base
6	Conductometric titration of mixture of acids vs. strong base
7	Potentiometric titration of strong acid vs. strong base
8	Potentiometric titration of weak acid vs. strong base
9	Potentiometric redox titration of potassium dichromate-ferric ammonium sulphate
10	Potentiometric precipitation titration of Ag+ vs. KCl
11	Separation of amino acids by Paper Chromatography
12	Separation of alkaloids by Thin Layer Chromatography
13	Paper electrophoresis for separation of amino acids
14	Agarose gel electrophoresis for separation of proteins
15	Simultaneous estimation of Ibuprofen and Paracetamol by UV spectroscopy (Demonstration only)

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LESSON PLANS
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M.Sc. FORENSIC SCIENCE
Semester II

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: I/FS 201T (Forensic Physics & Ballistics)
Unit I: Forensic examination of Glass and soil **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. K. Rama**

Lecture No.	Topics to be covered
1	Glass: Types of glass and their composition
2	Forensic examination of glass fractures under different conditions
3	Determination of direction of impact: cone – Fracture, rib marks, hackle marks, backward fragmentation
4	Color and fluorescence of glass
5	Physical matching of glass fragments
6	Density comparison of glass
7	Physical measurements of glass
8	Refractive index by refractometer
9	Elemental analysis and Interpretation of glass evidence
10	Soil: Formation and types of soil - Composition and color of soil
11	Particle size distribution and Turbidity test of soil
12	Microscopic examination and Density gradient analysis of soil
13	Ignition loss and Differential thermal analysis of soil
14	Elemental analysis and Interpretation of soil evidence
15	Discussion on important case studies of glass and soil

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: I/FS 201T (Forensic Physics & Ballistics)
Unit II: Forensic examination of tool marks, paint and Forensic engineering
No. of Hours Allotted: 15

Name of the Teacher: **Dr. K. Rama**

Lecture No.	Topics to be covered
1	Paint: Types of paint and their composition
2	Macroscopic and microscopic studies, Pigment distribution of paint
3	Solubility test, pyrolysis chromatographic techniques of paint
4	TLC, UV-Vis and IR spectrophotometric analysis of paint
5	X-Ray diffractometric methods, Elemental analysis and Interpretation of paint evidence
6	Types and characteristics of tool marks
7	Tracing and lifting of toolmarks
8	Photographic examination of tool marks and cut marks on clothes and walls, etc
9	Restoration of erased/ obliterated marks on wood and leather
10	Restoration of erased/ obliterated marks on polymer
11	Elements of Forensic Engineering
12	Cement and its composition
13	Determination of adulteration in cement and Reinforced Cement Concrete
14	Determination of adulteration in Bitumen and road tar
15	Examination of electrical appliances and installations

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: I/FS 201T (Forensic Physics & Ballistics)
Unit III: Introduction to Forensic Ballistics **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. K. Rama**

Lecture No.	Topics to be covered
1	History and background of firearms – Classification of fire arms
2	Techniques of dismantling / assembling of fire arms
3	Identification of origin and their constructional features of firearms
4	Ammunition and their components - Types of ammunition
5	Classification and construction features of different types of cartridges
6	Types of primers, priming compositions
7	Propellants and their compositions
8	Improvised ammunition and safety aspects of handling fire arms and ammunitions
9	Direction of fire – Time of fire – Range of fire
10	Projectile velocity determination – Theory of recoil
11	Trajectory determination
12	Effect of projectile on hitting the target – Function of bullet shape – Striking velocity, striking angle – Tumbling bullets – Cavitations – Ricochet and its effects
13	Threshold velocity for penetration of skin, flesh, bones
14	Nature of wounds of entry, exit – Explosive wounds, antemortem and postmortem injuries
15	Evaluation of injuries caused due to firearms and Methods of measurement of wound ballistic parameters

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: I/FS 201T (Forensic Physics & Ballistics)
Unit IV: Analysis of GSR and examination of fired bullets and cartridges
No. of Hours Allotted: 15

Name of the Teacher: **Dr. K. Rama**

Lecture No.	Topics to be covered
1	Principles and practice of identification of firearms
2	Different types of marks produced during firing process on cartridge and on bullet
3	Techniques for obtaining test material from various types of weapons and their linkage with fired ammunition
4	Determination of range of fire and Time of firing
5	Different methods employed and their limitations - Stereo and comparison microscopy
6	Automatic bullet and cartridge comparison system
7	Mechanism of formation of GSR
8	Source and collection of GSR
9	Spot tests, chemical tests for GSR analysis
10	Identification of shooter
11	Instrumental methods of GSR analysis
12	Management and reconstruction of crime scene
13	Arms act
14	Report writing and court testimony
15	Case study

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: II/ FS 202T (Instrumental Methods of Analysis – II)
Unit I: Molecular Mass Spectrometry and SEM-EDX **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. Raju Jannapureddy**

Lecture No.	Topics to be covered
1	Molecular Mass Spectrometry
2	Molecular mass spectra
3	Ion sources and Microanalysis
4	Mass spectrometers
5	Interpretation of mass spectra
6	Applications of mass spectrometry
7	Atomic mass spectrometry
8	Mass spectrometers
9	Inductively coupled plasma-Mass spectrometry
10	Applications Mass spectrometry
11	SEM (Principles & Instrumentation)
12	SEM (Technique and applications)
13	EDX (Principles & Instrumentation)
14	EDX technique
15	EDX Applications

FORENSIC SCIENCE, DEPARTMENT OF CHEMISTRY, UCS, OU
LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: II/ FS 202T (Instrumental Methods of Analysis – II)
Unit II: Chromatographic Techniques

No. of Hours Allotted: 15

Name of the Teacher: **Dr. Raju Jannapureddy**

Lecture No.	Topics to be covered
1	Chromatographic Techniques – Introduction
2	History of Chromatography
3	Theoretical principles of Chromatography
4	Classification of Chromatographic Methods
5	Adsorption and Partition Chromatography
6	Principles, instrumentation, techniques and applications of Thin Layer
7	Principles, instrumentation, techniques and applications of High Performance Thin Layer Chromatography
8	Method Development in Planar Chromatography
9	Chromatography – Instrumentation – Detectors - Adsorption, Partition
10	Gas-Solid, Gas-Liquid, Instrumentation – Detectors - Adsorption, Partition
11	Gas Isothermal, Linear Temperature Programming
12	Chiral, Pyrolysis and Derivatization Chromatography -
13	Columns and Stationary Phases
14	Column Efficiency – Method Development
15	Forensic Applications of Gas Chromatography

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: II/ FS 202T (Instrumental Methods of Analysis – II)
Unit III: HPLC and Capillary electrophoresis **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. Someshwar Pola**

Lecture No.	Topics to be covered
1	High Performance Liquid Chromatography
2	Instrumentation – Detectors
3	Columns and Stationary Phases
4	Isocratic, Gradient, Adsorption
5	Partition, Ion Chromatography
6	Derivatization Chromatography
7	Method Development
8	Applications of Liquid Chromatography
9	Super Critical Fluid Chromatography
10	Properties of Super Critical Fluids
11	Instrumentation
12	Columns – Detectors – Applications
13	Capillary electrophoresis
14	Principles, instrumentation, technique of electrophoretic techniques
15	Applications of electrophoresis in forensic science

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: II/ FS 202T (Instrumental Methods of Analysis – II)
Unit IV: Hyphenated techniques **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. Raju Jannapureddy**

Lecture No.	Topics to be covered
1	Unit Measurements, signals and data – Introduction.
2	Signal to noise ratio
3	Sensitivity and detection limit
4	sources of noise
5	Evaluation and measurement
6	Accuracy and instrument calibration
7	Hyphenated techniques
8	Principle, instrumentation
9	Techniques and applications of GC-FTIR
10	Techniques and applications of GC-MS
11	Techniques and applications of LC-MS
12	Techniques and applications of CE-MS
13	Techniques and applications of MS-MS
14	Techniques and applications of MS-MS
15	Application of instrumentation in forensic science

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: III/FS 203T (Forensic Biology & Biological Techniques)
Unit I: Forensic Botany **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Forensic Biology - Introduction – Scope
2	Various forms of biological evidences like wood, timber varieties, seeds and leaves
3	Various forms of biological evidences like wood, timber varieties, seeds and leaves Their identification and matching
4	Forensic Botany
5	Toxic principles of plants and their forensic significance
6	Identification of poisonous plants and mushrooms of India
7	Diatoms - Types – Morphology
8	Methods of isolation from tissues and bones
9	Forensic significance in drowning cases
10	Study and identification of pollen grains
11	Identification of starch grains,
12	Identification of stains of spices
13	Identification of powder
14	Paper pulp identification
15	Isolation and identification of microbial organisms

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: III/FS 203T (Forensic Biology & Biological Techniques)
Unit II: Forensic Anthropology & Odontology **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Forensic Anthropology – History - Scope and development
2	Role of forensic anthropologist
3	Collection and preservation of evidences
4	Human osteology - Determination of age, sex, stature
5	Determination of personal identity by superimposition technique
6	Video image analysis - Facial reconstruction
7	Legal provisions and tools involved in it
8	Pathology of bones and its importance in identification
9	Identification of burnt bones in accidents, crimes and mass disaster
10	Identification of skeletal remains in accidents, crimes and mass disaster
11	Forensic Odontology: Introduction - Structure and types of teeth
12	Dentition and dental formula - Dental diseases
13	Determination of age, sex and race from teeth
14	Role of teeth in mass disaster
15	Forensic significance in identification

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: III/FS 203T (Forensic Biology & Biological Techniques)
Unit III: Examination of Hair and Fibre, Forensic Entomology
No. of Hours Allotted: 15

Name of the Teacher: **Dr. T. Sowmyya**

Lecture No.	Topics to be covered
1	Hair Examination – Introduction - Structure of hair - Growth and chemistry of hair
2	Identification and comparison of hair by microscopic – Chemical - Biochemical and instrumental methods
3	Identification of animal hair - Assessment of age, sex, race and site of hair
4	Analysis of drugs and elements in hair - Hair diseases
5	Hair transfer, persistence and recovery - DNA typing of hair
6	Fibre Examination – Introduction - Classification of fibres - Identification and comparison of fibres by physical - Chemical – Microscopic – Spectroscopic - Chromatographic methods
7	Persistence and recovery of fibres - Forensic significance
8	Forensic Entomology: Introduction - Analyzing crime scene for entomological evidence
9	Collection of climatological data and specimen before body removal
10	Common arthropod found on the dead body Determination of time of death
11	Entomological succession in case of buried
12	Drowned bodies
13	Buried bodies
14	Forensic Entomology significance
15	Forensic Entomology application

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: III/FS 203T (Forensic Biology & Biological Techniques)
Unit IV: Wildlife Forensics and Microscopy **No. of Hours Allotted:** 15

Name of the Teacher: **Dr. C. Srinivasulu**

Lecture No.	Topics to be covered
1	Wild Life Forensics: Introduction - Importance of wild life
2	Wild life Protection Act - Endangered species
3	CITES - Census of wildlife population
4	Wild life crime
5	Methods of smuggling and poaching of wild life artifacts - Crime scene search
6	Criminal investigation - Determination of time of death - Sex determination from bones
7	Identification of teeth, claws, Ivory, Horns, antlers, furs, skin, bite marks, pug marks
8	Identification of blood, excreta and bones by biochemical and immunological methods
9	Microscopy – Basic principles and applications of: Simple and Compound Microscope
10	Comparison Microscope, Phase Contrast Microscope
11	Stereo Microscope, Polarizing Microscope,
12	Infra-red Microscope
13	Fluorescent Microscope
14	Scanning Electron
15	Microscope and Transmission Electron Microscope

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: IV/ FS 204T (Forensic Medicine)
Unit I: Introduction to Anatomy and Physiology **No. of Hours Allotted:** 15

Name of the Teacher: **Mr. B. Rajesh**

Lecture No.	Topics to be covered
1	Structural levels of organization of human body
2	Structure and Functions of heart
3	Structure and Functions of heart
4	Digestive system and its parts
5	Process of digestion and absorption of food in the alimentary canal
6	Respiratory system and its parts
7	Mechanism and regulation of respiration
8	Structure and functions of neuron
9	Transmission of nerve impulse
10	Central and Peripheral Nervous systems and their functions
11	Endocrine system - Characteristics of hormones
12	Endocrine glands and their hormones
13	Structure and functions of kidneys
14	Formation and composition of urine
15	Male and female reproductive systems and their functions

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: IV/ FS 204T (Forensic Medicine)
Unit II: Introduction to forensic medicine and personal identification
No. of Hours Allotted: 15

Name of the Teacher: **Dr. N. Lakshmikanth Reddy**

Lecture No.	Topics to be covered
1	Introduction to Forensic Medicine
2	Personal identification of living
3	Personal identification of dead
4	Postmortem examination (autopsy)
5	Thanatology
6	Medico legal aspects of death
7	Causes of death
8	Sudden death
9	Postmortem changes and their importance in determination of time after death
10	Introduction to Mechanical injuries
11	Types of Mechanical injuries
12	Medico legal aspects of Mechanical injuries
13	Introduction to Thermal injuries
14	Types of Thermal injuries
15	Medico legal aspects of Thermal injuries

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: IV/ FS 204T (Forensic Medicine)
Unit III: Introduction to Forensic pathology and deaths due to various aspects
No. of Hours Allotted: 15

Name of the Teacher: **Dr. S. Suraj**

Lecture No.	Topics to be covered
1	Forensic pathology
2	Collection of pathological evidence
3	Preservation of pathological evidence
4	Examination of decomposed bodies
5	Examination of mutilated bodies
6	Examination of burnt bodies
7	Exhumation procedure
8	Deaths from poisoning
9	Medico legal aspects of poisoning
10	Mechanical Asphyxia – Introduction and types
11	Medico legal aspects of Mechanical Asphyxia
12	Deaths from drowning
13	Medico legal aspects of drowning
14	Starvation and its Medico legal aspects
15	Lightning, Electrocution and their Medico legal aspects

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: IV/ FS 204T (Forensic Medicine)
Unit IV: Sexual offences and related aspects

No. of Hours Allotted: 15

Name of the Teacher: **Mr. B. Rajesh**

Lecture No.	Topics to be covered
1	Rape and Unnatural sexual offences
2	Medicolegal aspects of sexual offences
3	Introduction and types of Abortion
4	Medico legal aspects of Abortion
5	Introduction and types of Infanticide
6	Medico legal aspects of Infanticide
7	Impotence and sterility
8	Introduction to Virginity
9	Medico legal aspects of Virginity
10	Introduction to pregnancy
11	Medico legal aspects of pregnancy
12	Introduction to delivery and its process
13	Medico legal aspects of delivery
14	MPT Act
15	Linkage with forensic science laboratory

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: I/ FS251P (Forensic Physics Lab)
No. of Sessions Allotted: 15 (6 hours each)

Name of the Teacher: **Dr. B. Sammaiah**
Mr. M. Mahesh

Session No.	Topics to be covered
1	Examination of types of glasses
2	Examination of types of glass fractures
3	Determination of refractive indices of glass
4	Determination of refractive indices of liquids
5	Physical examination of soil for colour, moisture, organic matter, pH
6	Physical examination of soil for the presence of anthropogenic material and presence of biological material
7	Determination of particle size distribution of soils
8	Soil comparison by density gradient method
9	Examination of paint samples by microscopy
10	TLC comparison of paint evidence
11	Spectrophotometric comparison of paint evidence
12	Examination of counterfeit currency
13	Comparison of tool marks
14	Restoration of erased identification marks from metal surfaces
15	Report writing

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: II/FS252P (Forensic Ballistics Lab)
No. of Sessions Allotted: 15 (4 hours each)

Name of the Teacher: **Dr. B. Sammaiah**
Mr. B. Rajesh

Session No.	Topics to be covered
1	Characteristics of Firearms Calibre, Choke, Trigger pull, Proof marks etc.
2	Identification of parts and action mechanism of shot gun
3	Identification of parts and action mechanism of rifles (Revolver, Pistol, AK47,etc.)
4	Study of Muzzle loaders
5	Study of ammunition of shotgun
6	Study of ammunition of rifled firearms
7	Examination and Comparison of fired bullets Calibre, rifling characteristics, probable type of firearms
8	Examination and Comparison of fired Cartridges/cases (Calibre, firing pin, breech face, Extractor / Ejector marks etc.)
9	Determination of shot number from size and weight of shots
10	Identification of types of bullets
11	Identification of propellants
12	Determination of range of firing
13	Chemical tests for powder residues (Walker's test) and Barrel wash
14	Determination of bullet entry and exit hole on glass pane
15	Test firing of bullets and its comparison (Demonstration only)

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LESSON PLAN FOR THE ACADEMIC YEAR 2022-2023 (Semester II)

Class: M.Sc. Forensic Science **Section:** Semester II
Course/Paper: III/ FS253P (Forensic Biology Lab)
No. of Sessions Allotted: 15 (6 hours each)

Name of the Teacher: **Dr. T. Sowmyya**
Mr. M. Mahesh

Session No.	Topics to be covered
1	Study of human skeletal system
2	Study of human skeletal system
3	Determination of age from teeth
4	Determination of age from skull
5	Determination of sex from skull
6	Determination of sex from pelvic girdle
7	Estimation of stature from long bones
8	Isolation and Identification of diatoms
9	Isolation and Identification of pollen grains
10	Identification of starch granules
11	Microscopic and chemical comparison of paper pulp
12	Morphological & Microscopic characteristics of plant material-Nerium
13	Morphological & Microscopic characteristics of plant material- Cannabis
14	Morphological & Microscopic characteristics of plant material -Datura
15	Morphological & Microscopic Examination of human and animal hairs