



List of New Course(s) Introduced

Department : Forensic Science

Programme Name : Ph.D.

Academic Year : 2021-22

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	DFSC-PP-01	Research Methodology And Scientific Communication
02.	DFSC-PP-02	Analytical Approaches In Forensic Techniques (Physical, Chemical & Biological)
03.	DFSC-PP-03	Advance And Applied Forensic Science

Department : Forensic Science

Programme Name : B.Sc.

Academic Year : 2021-22

List of New Course(s) Introduced

Sr. No.	Course Code	Name of the Course
01.	LS/FSC/SEC/301-L	Introduction to Biometry
02.	LS/FSC/SEC/301-P	Practical's based on Introduction to Biometry
03.	LS/FSC/SEC/301-L	Handwriting Identification and Recognition
04.	LS/FSC/SEC/301-P	Practical's based on Handwriting Identification and Recognition



Minutes of Meetings (MoM) of Board of Studies (BoS)

Academic Year : 2019-20

School : School of Studies of Interdisciplinary Education &

Department : Forensic Science

Date and Time : 31/10/2021, 02:00 PM

Venue : on Google Meet Platform

The scheduled meeting of member of Board of Studies (BoS) of Department of Forensic Science, School of Studies of Interdisciplinary Education & Research, Guru Ghasidas Vishwavidyalaya, Bilaspur was held to design and discuss the syllabus of 3 year UG Program as per CBCS scheme and syllabi.

The following members were present in the meeting:

1. Prof. Mitashree Mitra (External Expert Member BoS, Dept. of. Forensic Science , Pt. Ravi Shankar Shula University Raipur)
2. Dr. Sudhir Yadav (HOD, Dept. of Forensic Science-cum Chairman, BOS)
3. Dr. Ajay Amit (Invited Member BoS, Dept. of Forensic Science)
4. Dr. Chanchal Kumar (Invited Member BoS, Dept. of Forensic Science)
5. Miss. Blessi N. Uikey (Invited Member BoS, Dept. of Forensic Science)

Following points were discussed during the meeting

- ❖ It was unanimously resolved that for the skill development of the students, a paper on internship/Apprentice/Training/Industrial training and/or Visit program (2 credits) for 3-4 weeks be included in B.Sc. IVth and M.Sc. IInd semester. Students will do this after the end of respective examination i.e., during summer vacation of the university from the academic session 2021-22
- ❖ To approve minor change in the syllabus of Undergraduate course of Forensic Science, Paper SEC of semester 3rd (LS/FSC/SEC/301-L & LS/FSC/SEC/301-P) and IVth (LS/FSC/SEC/402-L LS/FSC/SEC/402-P) of B.Sc. Homs. N Forensic Science.
- ❖ To discuss and approve the draft of the syllabus and Examination scheme of M.Sc. Forensic Science in accordance to CBXS from the academic session 2021-22.
- ❖ To approve Pre-Ph.D. course work syllabus and scheme of examination of department of Forensic Science for the implementation from the academic session 2021-22
- ❖ To discuss learning outcome based curriculum frame work



Scheme and Syllabus

File No. 16015
23/03/2022

Syllabus for
Pre-Ph.D. Course Work
In
Forensic Science
2022-2023

FORENSIC SCIENCE

23/03/2022

School of Interdisciplinary Education & Research
Department of Forensic Science
Guru Ghasidas Vishwavidyalaya
Bilaspur (C.G.)-495009

Pre-Ph.D. Course Work in Forensic Science



Pre-Ph.D. Course Work Forensic Science

(Scheme of Examination)

Course	Course Code	Name of the course	Credit	Hours / week
Paper-1	DFSC-PP-01	Research Methodology and Scientific Communication & Research Ethics	04	04
Paper-2	DFSC-PP-02	Analytical Approaches in Forensic Techniques (Physical, Chemical & Biological)	04	04
Paper-3	DFSC-PP-03	Advance & Applied Forensic Science	04	04
Seminar	DFSC-PS-04	-----	----	----
Total Credits			12	12

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SYLLABUS
(Pre-Ph.D. Coursework)
DEPARTMENT OF FORENSIC SCIENCE
Paper-I (DFSC-PP-01)

Research Methodology and Scientific Communication and Research Ethics

UNIT-I

Elements of a Quality Management System: Quality, Total Quality, Quality assurance, Quality control Quality system, Quality Planning, Quality Audit: Internal and External Audit & MRM, History and development of ISO, Terminology of NABL, Benefits of ISO standards and Requirements, IEC-17025, PR Issues, Ethical Issues, Essential requirements for the competence of testing and calibration laboratories, LIMS, Introduction, scope, management Requirements: Organizational, Documents control, Review of requests and Calibrations, Laboratory Hazards, Good Laboratory Practices, Purchasing service and supplies, service to the clients, complaints, corrective and preventive action, control of records

UNIT- II

Sampling: sampling procedures (random and non-random), sampling statistics, Physical state, homogenization, size and hazards in sampling, Sampling Error, Significance of statistics in forensic science, Descriptive Statistics- Basic concepts of frequency distribution, Measure of Central Values - Mean, median and mode, Measures of Dispersion- Range, Mean deviation and Standard deviation, Standard Error, Inferential Statistics-Correlation and Regression analysis, Probability- Definition, Theory, Classical and types, Chi Square Test of Association and Independence, t-test, z-test, One-way and Two-way ANOVA, AMOVA, Relative Risk and Path Analysis.

UNIT -III

Meaning of research Problem: Research, definition, Objectives of research, Types of research-From the viewpoint of application, Hypothesis and its Testing, Objectives, Inquiry mode, Search for existing literature, Interpretation and Report Writing, Research Communication, Plagiarism, Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific misconducts: Falsification, Fabrication and Plagiarism (FFP), Redundant publications: duplicate and overlapping publications, salami slicing, Selective reporting and misrepresentation of data.

UNIT -IV

Publication ethics: definition" introduction and importance, Best practices / standards setting initiatives and guidelines: COPE, WAME, etc. Conflicts of interest, Publication misconduct:

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definition, concept, problems that lead to unethical behaviour and vice versa, types. Violation of publication ethics, authorship and contributor-ship, Identification of publication misconduct, complaints and appeals. Predatory publishers and journals. Open access publications and initiatives, SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies, Software tool to identify predatory publications developed by SPPU, Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer, Journal Suggester, etc.

UNIT -V

Subject specific ethical issues, FFP, authorship, Conflicts of interest, complains and appeals: examples and fraud from India and abroad. Use of plagiarism software like Turnitin, Urkund and other open source software tools. Indexing databases, 2. Citation databases: Web of Science, Scopus, etc. Impact Factor of journal as per Journal citation Report, SNIP, SJR, IPP, Cite Score. Score. 2. Metrics: h-index, g index, i10 index, altmetrics

Recommended Books:

1. ISO/IEC/17025:2005, NABL -113, NABL -113A, 131, guidelines of NABL.
2. International Standard on General requirements for the competence of testing and calibration laboratories. 1st Ed., 1999-12-15, ISO/IEC 17025:1999(E). C.G.G.
3. Kothari, C.R. Research Methodology Methods and Techniques. Wiley Eastern Limited, New Delhi.
4. Saferstein R. Forensic Science Handbook I, II, III.
5. William L. Duncan: Total Quality, Key Terms and Concepts.
6. Murray S. Cooper: Quality control in the Pharmaceutical Industry.
7. John T. Rabbitt, Peter A Bergh: The ISO 9000 Book.
8. Willard Merritt, Dean & Settle: Instrumental Methods of Analysis.
9. Jami St. Clair Crime Laboratory Management: Academic Press.
10. Thomas A The laboratory Quality Assurance system: A manual of Quality Procedures and forms.
11. Ratliff. 2003 3rd ed. John Wiley & Sons.
12. Gary B Clark Systematic Quality Management. Practical Laboratory Management Series.
13. Bird, A. (2006). Philosophy of science. Routledge.
14. MacIntyre, Alasdair (1967) A Short History of Ethics. London.
15. P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:97E.9387480865

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16. National Academy of Sciences National Academy of Engineering and Institute of Medicine.
(2009). On Being a Scientist: A Guide to Responsible conduct in Research: Third Edition
National Academies Press.

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Paper-2 (DFSC-PP-02)

Analytical Approaches in Forensic Techniques (Physical, Chemical & Biological)

UNIT-I

Nature, Scope, Basic principles & Forensic Applications of Microscopy. Comparison microscope, Stereoscopic microscope, Fluorescent Microscopy, Infra Red Microscopy, Scanning Electron Microscope (SEM) & Transmission Electron Microscope (TEM). General principles of Immuno chemical technique, Antigen-Antibody binding, Precipitation, Agglutination, Complement fixation, Gel immuno diffusion, Immuno electrophoresis, Radio Immuno assay, ELISA, Fluorescent immuno assay, Fluorescent Activated Cell Sorting (FACS).

UNIT-II

Nature, Scope, Concepts, Basic Principles & Forensic Science Applications of UV-Visible spectroscopy, Infra Red (IR) Spectroscopy, Fourier transform Infra Red (FTIR) Spectrophotometer Atomic Absorption Spectrophotometry (AAS), Atomic emission Spectrometry (AES), Inductive coupled plasma (ICP), X-ray spectroscopy, Auger emission spectroscopy, Mass spectrometry.

UNIT-III

Nature, Scope, Concepts, Basic Principles & Forensic Science Applications of Chromatography, Thin Layer chromatography (TLC), High Performance Liquid Chromatography (HPLC), Gas Chromatography (GC) and High performance Thin layer Chromatography (HPTLC).

UNIT-IV

Nature, Scope, Basic principles & Forensic Applications Electrophoretic Technique, General principles, Factors affecting electrophoresis, High voltage electrophoresis, polyacrylamide gel electrophoresis, Isoelectric focusing (IEF), Isoelectrophoresis, Preparative, Horizontal and Vertical Electrophoresis.

UNIT-V

Molecular Biology Techniques: Genetic Manipulations, Restriction enzymes, Gene cloning, Cloning strategies, cloning vectors- Plasmids, Cosmids, phagemids, BAC, YAC, DNA extraction, Polymerase chain reaction, DNA sequencing methods and its advances, Mutagenesis, Gene Libraries, Colony Hybridization, Nick translation, Expression of Genes etc.

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Recommended Books:

1. John C. Lindon, George E. Tranter & John L. Holmes; Encyclopedia of Spectroscopy & Spectrometry, Academic Press (2000).
2. Cottrell, C.T. Irish, D. Msters V M., and Steward, J.E. (1985) Introduction to ultraviolet and visible spectrophotometry, 2nd ed. Pye Unicam, Cambridge.
3. Burgess, C., and Knowle, A. (1981) Technique in visible and Ultraviolet absorption spectroscopy, Chappman and Hall, London.
4. Claridge, T. D. W., High-Resolution NMR Techniques in Organic Chemistry. A Practical Guide to Modern NMR for Chemists, OUP, Oxford, 2000.
5. Gunther, H., NMR Spectroscopy. Basic Principles, Concepts and Applications in Chemistry, 2nd Edn, Wiley, Chichester, 1995.
6. Chapman, R (1985) Practical Organic Mass Spectrometry, Wiley & Sons, London.
7. Davis, R. and Frearson, M. (1987) Mass Spectrometry, Wiley, London.
8. McLafferty, F.W. and Turecek, F. (1993) Interpretation of Mass Spectra, 4th edn., University Science Books, Mill Valley, USA.
9. Working Procedure Manual: Physics/Chemistry DFS, Publication (2005).
10. Long, D.A. (1977) Raman spectroscopy, McGraw-Hill, Maidenhad.
11. Alan Gunn Essential forensic biology Jhon. Wiley.
12. Barbara Wheeler Lori J. Wilson, Practical Forensic Microscopy: A Laboratory Manual.
13. Bryan L. William & Keith Wilson; Principles & Techniques of Practical Biochemistry, Edward Arnold Pub. (1975).
14. Keith Wilson & John Walker; Practical Biochemistry-Principles & Techniques, 5th Ed., Cambridge University Press.
15. George M. Malacinski; Essentials of Molecular Biology, 4th Ed. Jones and Bartlet Pub. (2003).
16. Gardnes & Snustd; Principles of Genetics 6th Ed., John Wiley & Sons
17. D.M. Weir; Hand Book of Experimental Immunology, 2nd Ed., Blackwell Pub.
18. Ivan M. Roett; Essential Immunology, 6th Ed., Blackwell Pub.
19. Working Procedure Manual Biology / Serology, DFS Pub New Delhi 2005

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Paper-3 (DFSC-PP-03)

Advance & Applied Forensic Science

UNIT-I

Nature, Scope & Definition of Forensic chemistry, Introduction to Narcotic drugs, Depressants, stimulants, and Hallucinogens their Active components and legal issues and method of analysis of Designer Drugs & Anabolic steroids. Forensic Medicine- Definition, Scope and Importance, Post-mortem examination, Death: Definition, types, and nature, time since death, Injuries-Definition and Nature, Estimation of Age of injuries from Ante-mortem and Post mortem injuries, Burns-Classification, Ante-mortem and Post mortem Burns,

UNIT-II

Toxicology, Poisons-Definition & Classification, Collection and Preservation of Viscera and other relevant material. Isolation and identification of Plant Poisons, opium and its derivatives, Benzodiazepine tranquilizers, Metallic Poison, Insecticides and Pesticides. Basic concepts of Poisonous Mushrooms, Poisonous fungi, Food Poisoning, Common vegetable abortifaciant, Animal poison, Snake venom.

UNIT-III

Serology & Immunology, Blood: Composition and Histology, Examination & Identification of blood, blood stains & Analysis of Blood Pattern, and other body fluids/stains viz. menstrual blood, semen, saliva, sweat, tear, pus, vomit, hair, bone, nail, Secretors and Non-secretors. Immunology: Cell & Organ of immune system, Haematopoiesis, immune response, innate and acquired immunity, Antigens, Immunoglobulin: Types, Physio-chemical properties and function. Antigen-Antibody Reactions: Precipitation, agglutination, complement fixation, Compliment system, Major Histo-compatibility Complexes (MHC) and antigen presentation. Autoimmunity, Apoptosis.

UNIT-IV

An Introduction to Genetic Material, Structure of DNA, Chemical nature of DNA, Physiochemical properties of DNA, Denaturation and Renaturation kinetics of DNA, Central Dogma, DNA extraction and Quantification; Basic concept of sequence variation - VNTRs, STRs, Mini STRs, SNPs. Mitochondrial DNA Evaluation of results, frequency estimate calculations and interpretation, Allele frequency determination, STR Profiling: Structure of STR loci; The development of STR multiplexes; Detection of STR polymorphisms; Interpretation of result; Assessment of STR profiles: Stutter peaks. Sp. Pull-up; Degraded DNA; Statistical Assessment of STR profiles;

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and



estimating the frequencies of STR profiles. History of DNA profiling applications in disputed paternity cases, child swapping, missing person's identity, civil immigration, limitations of DNA profiling.

UNIT-V

Detection techniques- RFLP, PCR amplifications, Massive parallel sequencing, Y-STR, Advance Cloning methods, Analysis of SNP, DNA chip technology- Microarrays Cell free DNA, mi-RNA and its role in forensic science, RNAseq, Chip-Seq, Match probability - Database, DNA typing from blood, semen, bone and teeth and the use of DNA typing in wildlife investigations.

Recommended Books:

1. Khan, Javed I., Ho, Mat H. Analytical Methods in Forensic Chemistry. New York: Working Procedure Manual Chemistry/Toxicology/Explosives/Narcotics, DFS Pub. New Delhi
2. Kennedy, Thomas J., Christian, Jr., Donnell Basic Principles of Forensic Chemistry, Springer
3. Saferstein, Criminalistics: An Introduction to Forensic Science. Prentice Hall
4. Maudham, B. et al; Vogel's Textbook of Quantitative Chemical Analysis, Longman
5. John D. DeHaan ; Kirk's Fire Investigation, Prentice Hall Eaglewood Cliffs, N.J
6. Yinon J; Modern Methods & Application in Analysis of Explosives, John Wiley.
7. C.A. Watson; Official and standardized Methods of Analysis. Royal Society of Chemistry, UK.
8. Coyle, H. (ed.) Nonhuman DNA Typing, International Forensic Science and Investigation Series, CRC Press, Boca Raton.
9. Niels Morling, Handbook of Forensic Genetics (Forensic Science and Medicine) Humana Press.
10. John M. Butle. Forensic DNA Typing, Second Edition: Biology, Technology, and Genetics of STR Markers Elsevier Academic Press.

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B.Sc IIIrd Semester

LS/FSC/SEC/301-L

Skill Enhancement Course (SEC-1)

Introduction to Biometrics

Learning Objectives: After studying this paper the students will know –

- The fundamental principles on which the science of fingerprinting is based.*
- Fingerprints are the most infallible means of identification.*
- The world's first fingerprint bureau was established in India.*
- Biometrics uses in different aspects.*
- Different types of Biometric parameters*

Unit 1: Definition of Biometrics, Features and function of biometric system, working of biometrics, Classification of biometric systems – physical and behavioral. Strength and weakness of physical and behavioral biometrics.

Unit 2: Physical Biometrics: Fingerprints, Iris, Retina, Facial recognition, Hand geometry, DNA.

Unit 3: Behavioral Biometrics: Speaker recognition, Signature, Gait biometrics.

Unit 4: Biometric parameters: FM, FNM, FTC, FTE, FAR, FRR, EER, ROC, DET; Emerging Biometric Technologies.

Suggested Readings:

1. J.E. Cowger, Friction Ridge Skin, CRC Press, Boca Raton (1983).
2. D.A. Ashbaugh, Quantitative-Qualitative Friction Ridge Analysis, CRC Press, Boca Raton (2000).
3. C. Champod, C. Lennard, P. Margot and M. Stoilovic, Fingerprints and other Ridge Skin Impressions, CRC Press, Boca Raton (2004).
4. Lee and Gaensle's, Advances in Fingerprint Technology, 3rd Edition, R.S. Ramotowski (Ed.), CRC Press, Boca Raton (2013).



B.Sc IIIrd Semester
LS/FSC/SEC/301-P
Skill Enhancement Course (SEC-1)
Practical's Based Introduction to Biometrics

1. To study gait pattern.
2. To identify different Fingerprint patterns.
3. To locate and identify ridge characteristics.
4. To carry out classification of Fingerprints.
5. To study characteristics of palm prints.
6. To compare Signature using various tools.
7. To study Multi-modal Biometric system.
8. To study use of Biometric system for Civil and Police work.
9. To study specifications of Retina and Iris Biometric Device.
10. To study various Devices in Biometric system.





B.Sc IVth Semester
LS/FSC/SEC/402-L
Skill Enhancement Course (SEC-2)
Handwriting Identification and Recognition

Learning Objectives: After studying this paper the students will know –
a. The importance of examining questioned documents in crime cases.
b. The tools required for examination of questioned documents.
c. The significance of comparing hand writing samples.
d. The importance of detecting frauds and forgeries by analyzing questioned documents.

Unit 1: Handwriting Identification

Basis of handwriting identification. Characteristics of handwriting – scope and application. Class and individual characteristics. Arrangement, alignment, margin, slant, speed, pressure, spacing, line quality, embellishments, movement and pen lifts. Factors influencing handwriting – physical, mechanical, genetic and physiological.

Unit 2: Handwriting Examination

Basis of handwriting comparison. Collection of handwriting samples. Forgery detection. Counterfeiting. Examination of altered and erased documents. Tools used in handwriting examination.

Unit 3: Handwriting Recognition

Basis of handwriting recognition. Off-line and on-line handwriting recognition. Steps involved in handwriting recognition – pre-processing, feature extraction and classification. Applications of handwriting recognition.

Unit 4: Basic tools for examination of Documents

Application of Basic tools for the examination of Questioned document, Ultraviolet, Visible and Fluorescence Spectroscopy. Photomicrography, Microphotography. Video Spectral Comparator, Electrostatic Detection Apparatus.

Suggested Readings:

1. O. Hilton, Scientific Examination of Questioned Documents, CRC Press, Boca Raton (1982).
2. A.A. Moenssens, J. Starrs, C.E. Henderson and F.E. Inbau, Scientific Evidence in Civil and Criminal Cases, 4th Edition, Foundation Press, New York (1995).
3. Albert S. Osborn; Questioned Documents, 2nd Ed., Universal Law Pub., Delhi.
4. Wilson R. Harrison; Suspect Documents Their Scientific Examination.
5. Saferstein, Criminalistics: An Introduction to Forensic Science. Prentice, Hall.
6. Sharma, B.R.: Forensic Science in Criminal Investigation and Trials, Central Law Agency, Allahabad, 1974.



B.Sc IVth Semester
LS/FSC/SEC/402-P
Skill Enhancement Course (SEC-2)
Practical's Based Handwriting Identification and Recognition

1. To identify handwriting Characteristics.
2. To study handwriting characteristics (General and Individual).
3. To compare Signature sample.
4. Examination of Handwriting on unusual surfaces.
5. To study traced forgery
6. To examine indented writing using various tool.
7. To study simulated forgery.
8. Examination of security features of currency.
9. Examination of alteration and Obliterations.
10. To analyse Ink under VSC

