MAHARSHI DAYANAND UNIVERSITY, ROHTAK
DEPARTMENT OF FORENSIC SCIENCE
(A^+ Grade University Accredited by NAAC)
Ph.D. COURSE WORK IN FORENSIC SCIENCE W.E.F. 2023-24

Duration	**: One Semester (Six months)**
Total Credit requirement	**:12 credits**
Program Structure	**: Ph.D. in Forensic Science**
Program Code	**: FSPH**
Assessment Type	**: Formative**

Course Code	Nomenclature of Course	Theory marks	Internal Assessment marks	Maximum Marks	Hours/Week	Credits
25FSPH11C1	Research Methodology	70	30	100	04	04
25PHCC1 (Compulsory for all Ph.D. Course work)	Research & Publication Ethics	35	15	50	02	02
25FSPH11C3	Basics of Computers & Statistical Analysis	35	15	50	02	02
25FSPH11C4	Forensic Science and Research Techniques	70	30	100	04	04
Total Marks/ Credits		**210**	**90**	**300**	**12**	**12**

Note: i. The compulsory course on 'Research and Publication Ethics' shall be offered by Ch. Ranbir Singh Institute of Social and Economic Change for all UTDs/Centres/Institutes passed vide Resolution No. 27 of the 271st meeting of EC held on 29.7.2020.

***Internal Assessment for 30 Marks:**
Two assignments of 7.5% each
Two presentations of 7.5% each
****Internal Assessment for 15 Marks:**
One assignments of 7.5% each
One presentations of 7.5% each

MDU

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO-1: Student would be able to understand the basics of research and Students would become better prepared for future research in Forensic Science.

PSO-2: Students would better delineate research ethics and issues.

PSO-3: Students would be able to use computer and statistical methods of analysis in research development.

PSO-4: Students would be able to explore different fields available for research in forensic science.

PSO-5: Students would have a broader understanding of various methods and techniques used in forensic research.

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Name of the Course	Research Methodology	Course Code	25FSPH11C1
Hours/Week	04	Credits	04
Max. Marks: 70			

Course Objectives:

1. To impart knowledge about Purpose and types of Research in scientific fields.
2. To make students understand about component of research planning.
3. To make students aware of different funding agencies of India aiding research work.
4. To develop Identification and designing a research problem.
5. To develop a better understanding of writing of research events.

Course Outcomes:

1. Students would be able to understand purpose, characteristics and types of Research in forensic science.
2. Students would be able to know about different funding agencies of India aiding forensic research work.
3. Students would know about Ethical, legal, social and scientific issues in Forensic research.
4. Students would be able to write research proposals.
5. Students would be able gain the basic knowledge of organizing conferences, symposia, workshop, exhibition etc and their role in research enhancement.

Unit – I

Meaning, Purpose and Characteristics and Types of Research in scientific disciplines, Process of Research, Formulation of objectives, Formulation of Hypotheses, Types and methods of testing Hypotheses, Research plan and its components, Methods of Research: Survey, Observation, case study, experimental, historical and comparative methods.

Unit – II

Identification and formation of research problem (Hypothesis). Elements in research methodology: Research design (CRD, RBD, and LSD).

Unit – III

Introduction to Funding agencies aiding research in India especially DST, DBT, ICMR, CSIR, UGC, and role of DFSS and BPR&D towards R&D aid in Forensic Science. Role of IPR in Research and Development.

Unit – IV

Writing of Research Proposal, Report and Research Paper: Meaning and types -Stages in preparation - Characteristics - Structure - Documentation: Footnotes and Bibliography - Editing the final draft-Evaluating the final draft- Checklist for a good proposal/report/research paper. Basic knowledge of organizing conferences, symposia, workshop, exhibition etc. Basics of finding and publishing in good forensic journals.

References:

1. Adèr, H. J., & Mellenbergh, G. J. (1999).*Research methodology in the social, behavioural and life sciences*. London, : SAGE Publications, Ltd doi: 10.4135/9780857029027
2. Baldi, B., & Moore, D. S. (2014). *The practice of statistics in the life sciences*.
3. Verma, A. K. (2017). *Research methodology in Indian music: A step by step guide for beginners*.
4. Flick, U. (2015). *Introducing research methodology: A beginner's guide to doing a research project*. London: Sage Publications.
5. Kapoor, D. R., & Saigal, P. (2013). *Research methodology: Methods and techniques*. New Delhi: Regal Publications.
6. Llewelyn, D., Aplin, T. F., & Cornish, W. R. (2019). *Intellectual property: Patents, copyright, trade marks and allied rights*.
7. India., & National Science & Technology Management Information System (India). (1998). *Funding pattern of sponsored research by scientific agencies, 1990-91 to 1994-95*. New Delhi: Ministry of Science and Technology, Dept. of Science and Technology, Govt. of India.
8. Sharat, K., & Mathew, M. (2005). *Funding windows and research in India*. Delhi: Shipra.

Name of the Course	Research & Publication Ethics	Course Code	25PHCC1
Hours/Week	02	Credits	2
Max. Marks: 35			

Note:

1. **The compulsory course on 'Research and Publication Ethics' shall be offered by Ch. Ranbir Singh Institute of Social and Economic Change for all UTDs/Centres/Institutes passed vide Resolution No. 27 of the 271st meeting of EC held on 29.7.2020.**
2. **Assessment Criteria : Formative assessment shall be applicable as per Letter No. ACS-I/II/II12025/45680-750 dated 19.12.2025.**

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3.

Name of the Course	Basics of Computers & Statistics Analysis	Course Code	25FSPH11C3
Hours/Week	02	Credits	02
Max. Marks: 35			

Course Objectives:

1. To impart knowledge of statistical analysis & computers in students.
2. To make students understand about data types in research analysis.
3. To make students aware probability, variance and test for hypothesis in sciences.
4. To make students conversant with broader aspects of research statistical tools.
5. To develop a better understanding of computers and related tools and software used in routine forensic research.

Course Outcomes:

1. Students would be able to understand importance of various statistical methods in research analysis.
2. Students would understand Tests of hypothesis in research work.
3. Students would be able to interpret statistical data.
4. Students would be able to gain basic knowledge of computer and various software's used in scientific research.

Unit – I

Introduction of Computers, Operating system and basics of Windows, DOS, UNIX. Difference between presentation and document, introduction to Notepad, MS-Office word, MS-Excel, Power Point, Opening Documents and Closing documents, introduction to Paint and Photoshop. Computer Communication

Unit – II

Basic concepts of frequency distribution, Measure of central values-Mean, median and mode, Measures of dispersion, range, mean deviation, Standard deviation, Correlation, Regression and Probability. Coefficient of Variation, Moment, Skewness and kurtosis, binomial, distribution, Normal distribution, hyper geometric distribution, correlated Measurements. Tests of significant of attributes, Z-test of significance and coefficient of correlation, Small sample test, T-test, Paired Test, Chi-square test, F test of equality of variance, Large sample test, Normal test. Brief introduction to SPSS, R (R Foundation for Statistical Computing), MATLAB (The Mathworks), Microsoft Excel, SAS (Statistical Analysis Software) and Minitab.

References:

1. Weaver, K. F. (2018). *An introduction to statistical analysis in research: With applications in the biological and life sciences*.
2. Elliott, A. C., & Woodward, W. A. (2007).*Statistical analysis quick reference guidebook*. Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781412985949
3. Huizingh, E. (2007). *Applied statistics with SPSS*. London, : SAGE Publications, Ltd doi: 10.4135/9781446249390
4. Vogt, W. P. (2011). *SAGE quantitative research methods*. Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9780857028228
5. Miller, D. C., & Salkind, N. J. (2002).*Handbook of research design & social measurement*. Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781412984386
6. Mortera, J. & Dawid, P. (2008). Probability and evidence. In Rudas, T. *Handbook of probability: Theory and applications* (pp. 403-422). Thousand Oaks, CA: SAGE Publications, Inc. doi: 10.4135/9781452226620
7. Robertazzi, T. G. (2012). Basics of computer networking. New York, NY: Springer.
8. Computer software. (1985). New York: W.H. Freeman.
9. Knight, G. (1968). *Computer software*. Washington: Cambridge Communication Corporation.
10. Barksdale, K., Rutter, M., & Teeter, R. (2002). *Internet basics*. Boston, Mass: Course Technology.

Name of the Course	Forensic Science and Research Techniques	Course Code	25FSPH11C4
Hours/Week	04	Credits	04
Max. Marks: 70			

Course Objectives:

1. Inculcate knowledge of forensic science in students.
2. To make students understand about forensic research.
3. To make students aware about basic Tools and techniques used in forensic sciences.
4. To make students conversant with broader aspects of research areas and trends.
5. To develop a better understanding of lacunae and solutions in forensic research.

Course Outcomes:

1. Students would be able to understand importance of research in Forensic science.
2. Students would understand techniques used in forensic chemical sciences;
3. Students would have broader knowledge of forensic biological methods and techniques.
4. Students would be able to gain knowledge of research in forensic physical sciences.
5. Students would acquire a better understanding of lacunae in forensic research.

Unit – I

Basics of Forensic Science: Forensic Science Laboratories development and set-ups of R&D work, Need and Scope of Forensic Science research, Basic Principles of Forensic Science, Branches of Forensic science, and Future research perspectives in Forensic Science. National and international forensic science avenues.

Unit – II

Forensic Chemical Techniques: Forensic Chemical evidences and related cases, Laboratories dealing with Forensic chemical evidences**,** Preliminary/screening and Instrumental cum Confirmatory techniques in forensic chemical sciences, analytical approaches (including qualitative, quantitative, destructive, non-destructive, specific and sophisticated), Research utilities and limitations of TLC, HPTLC, HPLC, GC, GC-MS, LC-MS, UV-vis, FTIR, AAS, and Mass Spectrometry in forensic chemical analysis. Recent research trends in FCS.

Unit - III

Forensic Biological Techniques: Need of biological analysis on Forensic Science, Electrophoretic Techniques: Theory, General Principles and Forensic applications. DNA Fingerprinting Techniques: DNA extraction, quantification, PCR and its modifications, RFLP, Combined DNA Index System (CODIS).

Unit - IV

Forensic Physical Techniques: Conventional and recent techniques and trends in the fields of Forensic Fingerprinting, Forensic Ballistics, Forensic Physics, Voice analysis, QDE, and Computer and Cyber forensics. Role of Light Microscopy, Electron Microscopy, Comparison Microscopy in forensic physical examination, use of Polygraph and BEOS and their legal prospectus.

References:

1. Nanda, B. B., & Tewari, R. K. (2001). *Forensic science in India: A vision for the twenty-first century*. New Delhi: Select Publishers.
2. Saferstein, R. (2020). *Criminalistics: An introduction to forensic science*.
3. National Institute of Justice (U.S.). (2004). *Education and training in forensic science: A guide for forensic science laboratories, educational institutions, and students*. Washington, DC: U.S. Dept. of Justice, Office of Justice Programs, National Institute of Justice.
4. Wouldard, H. H., Merritt, L. L., & Dean, J. A. (1974). *Instrumental methods of analysis: [by] Hobart H. Wouldard, Lynne L. Merritt [and] John A. Dean*. New York: Van Nostrand.
5. McNair, H. M. (2019). *Basic Gas Chromatography*. Wiley & Sons Canada, Limited, John.
6. Settle, F. . (1997). *Handbook of instrumental techniques for analytical chemistry*. Upper Saddle River, NJ: Prentice Hall.
7. Koppenhaver, K. (2007). *Forensic document examination: Principles and practice*. Totowa, N.J: Humana Press.