

Revised Syllabus

As per AAU/ICD/2018-19/852 dt. 24.01.2019

**UNIVERSITY OF MUMBAI**

No. UG/64 of 2018-19

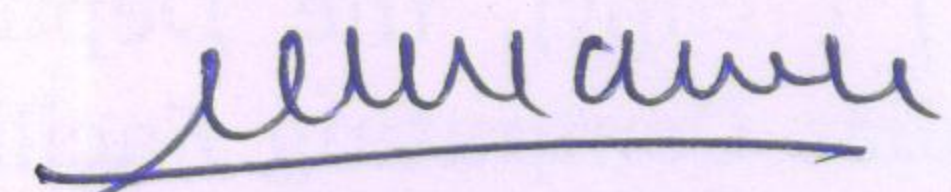
**CIRCULAR:-**

Attention of the Principals of the affiliated Colleges and Directors of the recognized Institutions in Science & Technology Faculty is invited to this office Circular Nos. UG/07 of 2013-14, dated 15<sup>th</sup> April, 2013 relating to syllabus of the Master of Science (M.Sc.) degree course.

They are hereby informed that the recommendations made by the Ad-hoc Board of Studies in Forensic Science at its meeting held on 7<sup>th</sup> June, 2018 have been accepted by the Academic Council at its meeting held on 14<sup>th</sup> June, 2018 vide item No. 4.48 and that in accordance therewith, the revised syllabus as per the (CBCS) for the M.Sc. in Forensic Science (Sem – I & II), has been brought into force with effect from the academic year 2018-19, accordingly. (The same is available on the University's website [www.mu.ac.in](http://www.mu.ac.in)).

MUMBAI – 400 032

To <sup>6<sup>th</sup> June, 2018</sup>  
<sup>July</sup>



(Dr. Dinesh Kamble)  
I/c REGISTRAR

The Principals of the affiliated Colleges & Directors of the recognized Institutions in Science & Technology Faculty. (Circular No. UG/334 of 2017-18 dated 9<sup>th</sup> January, 2018.)

**A.C./4.48/14/06/2018**

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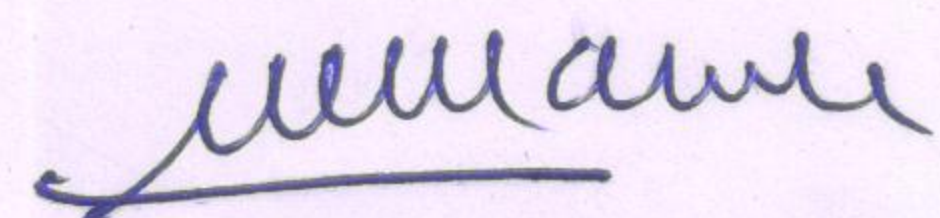
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MUMBAI-400 032

<sup>6<sup>th</sup> June, 2018</sup>  
<sup>July</sup>

Copy forwarded with Compliments for information to:-

- 1) The I/c Dean, Faculty of Science & Technology,
- 2) The Chairman, Ad-hoc Board of Studies in Forensic Science,
- 3) The Director, Board of Examinations and Evaluation,
- 4) The Director, Board of Students Development,
- 5) The Co-Ordinator, University Computerization Centre,



(Dr. Dinesh Kamble)  
I/c REGISTRAR

AC \_\_\_\_\_  
Item no. \_\_\_\_\_

# University of Mumbai



## Syllabus for Semesters - I & II

**Program - M. Sc.**  
**Faculty - Science**  
**Course - Forensic Science**

**Credit based Semester and Grading System (CBSGS)**

With effect from the academic year 2018-19

## 1. Course Structure & Distribution of Credits.

The M.Sc. in Forensic Science program is divided in four semesters with total 96 credits. The program consists of total 16 theory papers, total 7 practical lab courses and 1 project spread over four semesters. Each theory paper shall consist of four units. Lab course (practical paper) shall consist of minimum twelve experiments based on respective theory papers. For, M.Sc.- I (semester I & II ) there shall be eight theory papers and four theory based lab courses (practical papers) and shall be common and compulsory to all admitted learners. For M. Sc.-II ( semester III and IV) there shall be specializations in various subjects offered by the concerned Institution(s). Four Specializations viz. 1) **Questioned Documents, Finger prints and Forensic Physics** 2) **Forensic Chemistry and Toxicology** 3) **Forensic Biology, Serology and DNA Finger Printing** and 4) **Digital & Cyber Forensics and IT Security** may be offered subject to the availability of students and by adopting allotment procedure as mentioned in the preceding para. Each semester shall have four theory papers and two theory based lab courses (practical papers) related to specialization. In the fourth semester students will carry out Research project/ Dissertation in place of one practical paper. Each theory course will be of 4 (four) credits, a practical lab course will be of 4 (four) credits and a project will be of 4 (four) credits. A student earns 24 (twenty four) credits per semester and total 96 (ninety six) credits in four semesters. The course structure is as follows,

**Distribution of Marks and Credits:-** The number of theory / practical papers and marks / credit allotted for M. Sc. Forensic Science program shall be as under.

Year	Semester	No. of papers		Total Marks			Total Credits		
		Theory	Practical	Theory	Practical	Total	Theory	Practical	Total
M.Sc. – I (Common)	Sem.-I	04	02	400	200	600	16	08	24
	Sem.-II	04	02	400	200	600	16	08	24
M.Sc. – II (Specialization)	Sem.-III	04	02	400	200	600	16	08	24
	Sem.-IV	04	01 01 (project)	400	100 100	600	16	04 04	24
<b>Total</b>		16	08	1600	800	2400	64	32	96

### M.SC.- I :- Semester I & Semester II

Each, semester-I and II shall have four theory courses and two practical courses. The details are as follows:

**Theory Courses per semester = 4**

**Workload = 16 hours per week**

**Practical lab courses per Semester = 2**

**Workload = 16 hours per week**

Paper Code	Paper Title	Lectures ( Hrs)	Credits
<b>Semester – I : Theory papers</b>			
PSFS101	Crime Scene Science	60	04
PSFS102	Forensic Medicine	60	04
PSFS103	Digital and Cyber Forensics-I	60	04
PSFS104	Cyber Crime and Protection of Personal Data in Cyberspace	60	04
Total		240	16
<b>Semester – I : Practical lab courses</b>			
PSFS P101	Lab Course -1	120	04
PSFS P102	Lab Course -2	120	04

		Total	240	08
<b>Semester – II : Theory papers</b>				
PSFS201	Fingerprint and Questioned Document		60	04
PSFS202	Data Processing in Forensic Science		60	04
PSFS203	Digital and Cyber Forensics-II		60	04
PSFS204	E-commerce, E-Governance and Online Dispute Resolution		60	04
		Total	240	16
<b>Semester – II : Practical lab courses</b>				
PSFS P201	Lab Course -3		120	04
PSFS P202	Lab Course -4		120	04
		Total	240	08

### M.SC.- II :- Semester III & Semester IV

Each, Semester-III and IV shall have four theory courses and two practical courses of the specialization chosen by learner. The details are as follows:

**Theory Courses per semester = 4                      Workload = 16 hours per week**  
**Practical lab courses per Semester = 2              Workload = 16 hours per week**

**Specialization - 1 : Questioned Documents, Finger prints and Forensic Physics.**

Paper Code	Paper Title	Lectures ( Hrs)	Credits
<b>Semester – III : Theory papers</b>			
PSFSQ301	Specialization Paper -1	60	04
PSFSQ302	Specialization Paper -2	60	04
PSFSQ303	Specialization Paper -3	60	04
PSFSQ304	Specialization Paper -4	60	04
		Total	16
<b>Semester – III : Practical lab courses</b>			
PSFSQ P301	Lab Course -5	120	04
PSFSQ P302	Lab Course -6	120	04
		Total	08
<b>Semester – IV : Theory papers</b>			
PSFSQ401	Specialization Paper -5	60	04
PSFSQ402	Specialization Paper -6	60	04
PSFSQ403	Specialization Paper -7	60	04
PSFSQ404	Specialization Paper -8	60	04
		Total	16
<b>Semester – IV : Practical lab courses</b>			
PSFSQ P401	Lab Course -7	120	04
PSFSQ P402	Project	120	04
		Total	08

**Specialization - 2 : Forensic Chemistry and Toxicology.**

Paper Code	Paper Title	Lectures ( Hrs)	Credits
<b>Semester – III : Theory papers</b>			
PSFSC301	Specialization Paper -1	60	04
PSFSC302	Specialization Paper -2	60	04
PSFSC303	Specialization Paper –3	60	04
PSFSC304	Specialization Paper –4	60	04
Total		240	16
<b>Semester – III : Practical lab courses</b>			
PSFSC P301	Lab Course -5	120	04
PSFSC P302	Lab Course -6	120	04
Total		240	08
<b>Semester – IV : Theory papers</b>			
PSFSC401	Specialization Paper -5	60	04
PSFSC402	Specialization Paper -6	60	04
PSFSC403	Specialization Paper -7	60	04
PSFSC404	Specialization Paper -8	60	04
Total		240	16
<b>Semester – IV : Practical lab courses</b>			
PSFSC P401	Lab Course -7	120	04
PSFSC P402	Project	120	04
Total		240	08

**Specialization - 3 : Forensic Biology, Serology and DNA Finger Printing**

Paper Code	Paper Title	Lectures ( Hrs)	Credits
<b>Semester – III : Theory papers</b>			
PSFBSB301	Specialization Paper -1	60	04
PSFBSB302	Specialization Paper -2	60	04
PSFBSB303	Specialization Paper –3	60	04
PSFBSB304	Specialization Paper –4	60	04
Total		240	16
<b>Semester – III : Practical lab courses</b>			
PSFBSB P301	Lab Course -5	120	04
PSFBSB P302	Lab Course -6	120	04
Total		240	08
<b>Semester – IV : Theory papers</b>			
PSFBSB401	Specialization Paper -5	60	04
PSFBSB402	Specialization Paper -6	60	04
PSFBSB403	Specialization Paper -7	60	04
PSFBSB404	Specialization Paper -8	60	04
Total		240	16
<b>Semester – IV : Practical lab courses</b>			
PSFBSB P401	Lab Course -7	120	04
PSFBSB P402	Project	120	04
Total		240	08

### Specialization - 4 : Digital & Cyber Forensics and IT Security

Paper Code	Paper Title	Lectures ( Hrs)	Credits
<b>Semester – III : Theory papers</b>			
PSFSD301	Specialization Paper -1	60	04
PSFSD302	Specialization Paper -2	60	04
PSFSD303	Specialization Paper –3	60	04
PSFSD304	Specialization Paper –4	60	04
Total		240	16
<b>Semester – III : Practical lab courses</b>			
PSFSD P301	Lab Course -5	120	04
PSFSD P302	Lab Course -6	120	04
Total		240	08
<b>Semester – IV : Theory papers</b>			
PSFSD401	Specialization Paper -5	60	04
PSFSD402	Specialization Paper -6	60	04
PSFSD403	Specialization Paper -7	60	04
PSFSD404	Specialization Paper -8	60	04
Total		240	16
<b>Semester – IV : Practical lab courses</b>			
PSFSD P401	Lab Course -7	120	04
PSFSD P402	Project	120	04
Total		240	08

## 2. Award of Degree :

The candidate shall be awarded the degree of Master of Science in Forensic Science (**M. Sc. in Forensic Science**) after completing the course and meeting all the evaluation criteria. The statement of marks shall carry a name of the specializations as stated below.

No.	Specialization Chosen	Name appearing in the Statement of Marks	Name appearing in the Degree Certificate
1	Questioned Documents, Finger prints and Forensic Physics	M.Sc. in Forensic Science (Questioned Documents ,Finger prints and Forensic Physics)	M.Sc. in Forensic Science
2	Forensic Chemistry and Toxicology	M.Sc. in Forensic Science (Forensic Chemistry and Toxicology)	M.Sc. in Forensic Science
3	Forensic Biology, Serology and DNA Finger Printing	M.Sc. in Forensic Science (Forensic Biology, Serology and DNA Finger Printing)	M.Sc. in Forensic Science
4	Digital & Cyber Forensics and IT Security	M.Sc. in Forensic Science (Digital & Cyber Forensics and IT Security)	M.Sc. in Forensic Science

### 3. Scheme of Examination and Passing:

1. Each theory paper shall have 40% Term Work (TW) / Internal Assessment (IA) and 60% external (University written examination) of 2.5 Hours duration.
2. Each lab course shall have an external examination for 100 marks of 6 Hours duration. The distribution of marks shall be – Two experiments for maximum 40 marks each, Viva-voce for maximum 10 marks and maximum 10 marks for certified journal.
3. Project work shall have an external evaluation for 100 marks.
4. The external examination for Theory and Practical / Project shall be conducted by the University at the end of each Semester.
5. The marks for Term Work (TW) / Internal Assessment (IA) shall be assigned on the basis of seminar / presentations / tutorials/ home assignments to be conducted by the concerned Institution/ Department.
6. Term Work / Internal Assessment - IA (40%) and University examination (60%)- shall have separate heads of passing. For Theory courses, internal assessment shall carry 40 marks and Semester-end examination shall carry 60 marks for each theory Course.
7. To pass, a student has to obtain minimum grade point E, and above separately in the IA and external examination.
8. The candidates shall appear for external examination of 4 theory courses each carrying 60 marks of 2.5 hours duration and 2 practical courses each carrying 100 marks of 6 hours duration at the end of each semester.
9. The candidate shall prepare and submit for practical examination a certified Journal based on the practical course carried out under the guidance of a faculty member with minimum number of experiments as specified in the syllabus. Department(s) are advised to arrange maximum number of experiments from the list provided in the syllabus, minimum number of experiments are specified only for the purpose of certification of journal.

### 4. Standard of Passing for University Examinations:

As per ordinances and regulations prescribed by the University for semester based credit and grading system.

### 5. Standard point scale for grading:

Grade	Marks	Grade Points	Performance
O	80.00 and above	10	Outstanding
A +	70-79.99	9	Excellent
A	60-69.99	8	Very Good
B+	55-59.99	7	Good
B	50-54.99	6	Above Average
C	45-49.99	5	Average
D	40-44.99	4	Pass
F	Less than 40	0	Fail

### 6. Grade Point Average (GPA) calculation:

1. GPA is calculated at the end of each semester after grades have been processed and after any grade have been updated or changed. Individual assignments / quizzes / surprise tests / unit tests / tutorials / practical / project / seminars etc. as prescribed by University are all based on the same criteria as given above. The teacher should convert his marking into the Quality-Points and Letter-Grade.

2. Performance of a student in a semester is indicated by a number called Semester Grade Point Average (SGPA). It is the weighted average of the grade points obtained in all the subjects registered by the students during the semester

$\sum_{i=1} C_i p_i$	$C_i$ = The number of credits earned in the $i^{\text{th}}$ course of a semester.
$\text{SGPA} = \frac{\sum_{i=1} C_i p_i}{\sum_{i=1} C_i}$	$p_i$ = Grade point earned in the $i^{\text{th}}$ course $i = 1, 2, \dots, n$ represents number of courses for which the student is registered.

3 The Final remark will be decided on the basis of Cumulative Grade Point Average (CGPA) which is weighted average of the grade point obtained in all the semesters registered by the learner.

$\sum_{j=1} C_j p_j$	$C_j$ = The number of credits earned in the $j^{\text{th}}$ course upto the semester for which the CGPA is calculated
$\text{CGPA} = \frac{\sum_{j=1} C_j p_j}{\sum_{j=1} C_j}$	$p_j$ = Grade point earned in the $j^{\text{th}}$ course* $j = 1, 2, \dots, n$ represents number of courses for which the student is registered upto the semester for which the CGPA is calculated.
<p>* : A letter Grade lower than E in a subject shall not be taken into consideration for the calculation of CGPA</p>	
<p>The CGPA is rounded upto the two decimal places.</p>	

### 7. Eligibility:-

B.Sc. Forensic Science from recognized University / Institution with all papers dedicated to various disciplines of Forensic Science.

### 8. Intake Capacity :-

Sanctioned Seats to be filled as per following criterion.

I) 80% seats shall be reserved for the eligible candidates those have obtained the B.Sc. Forensic Science degree from Mumbai University.



II) 10% seats shall be reserved for the eligible candidate who has obtained the B.Sc. Forensic Science degree from the other University within the State of Maharashtra. One seat will be for open and the other seat will go for student having higher percentage from any reserved category.

III) 10% seats shall be reserved for the eligible candidate who has obtained the B.Sc. Forensic Science degree from the other State Universities and will be filled on the basis of merit.

*Note: 1. The marks obtained by candidate from criteria II & III shall not be less than the marks of the last candidate admitted in respective category from criteria I above .If candidates with such marks are not available then the seats will be filled up by candidate pertaining to criteria I.*

*2. If any seat remains vacant then it will be allotted to candidate pertaining to criteria I) above further vacant seat/s if any will be allocated to waitlist candidate belonging to criteria II or then to criteria III.*

*3. Prevailing reservation policies of Maharashtra state and University of Mumbai will be applicable.*

*4. Admissions will be strictly on the basis of merit and reservation policies.*

### **9. Allotment of specialization And Minimum intake capacity:-**

The specialization to the students shall be allotted in the beginning of Semester – III, on the basis of choice and merit (M.Sc.-I, semester I and II marks taken together) of the student. There shall be minimum 25% of the intake capacity / on roll students for each specialization. However, if the criterion of minimum intake capacity for a particular specialization as mentioned is not full filled, in such case the students will be diverted to other specialization strictly based on the marks obtained by him/her at M.Sc.-I examination. In such situation the decision of the Head of the concerned Institution shall be final.

### **10. Results Grievances / Redressal and ATKT rules :-**

Result Grievances / redressal /revaluation and ATKT rules shall be as made applicable by the University from time to time.

# SYLLABUS: Semester – I & Semester - II

## M.Sc. FORENSIC SCIENCE: SEMESTER - 1 (Theory Paper) PSFS 101: Crime Scene Science

Hours per week – 04

Credits – 04

### UNIT –I: Crime Scene Logistics

- Conviction, Conviction Rate and its Importance, Factors affecting conviction rate, NCRB and Conviction rate in India, Conviction rate in Maharashtra, role of Forensic in conviction, Importance of CSI & CSM, Crime scene science as a domain and department in Forensic Science, the crime scene, Nature and types of Scene of crime, crime scene investigator and manager, Roles and responsibility of different officers and staff at CS, Do & Don'ts at CS Protocol for CSI&CSM- Primary Survey, Barrication, Scene Documentation, Forensic Photography – scene photography and its method, Techniques in evidential photography, Closing Photography, Forensic Videography and its method, Note taking and its format, Crime scene sketching: types of sketch, method (Manual & Software) of making rough and final sketch, Investigative approach for evidence search, method for evidence searching, tools and technique for require of evidence. Scene management : Crime scene manager, resource management, manpower management, Logistics management, information and technology management, evidence management, co-ordination among investigating agency, security and safety guidelines for investigator on crime scene.

### UNIT –II: Forensic Evidences-

- Understanding of physical evidence nature and scope, evidential and juridical value (direct, circumstantial and corroborative), Importance of evidence in CJS, Identification, Recognition and Recovery of evidences, Basic types of evidence- visible, plastic, latent, micro & macro, trace and ultra-trace, pattern, fragile and digital evidence. Method for Search, Collection (preservation), Handling packaging, Important evidence such as Impression evidence (Fingerprints, Palm prints, lip prints, bare foot, ear prints) Casting evidences (Shoe prints, bite marks, tire marks, tools marks, striation marks) pattern evidence (Blood spatter, Gait, glass fracture, skid, Injury, burning) Biological evidence (blood, hair, nail, skin, saliva, urine, semen, teeth, bone, mucus, milk, Vaginal secretion, vitreous, fecal matter, DNA(n & m) Other Biological Evidence plant material (leaves, wood, flowers, pollen, roots, seeds) animas material (feather, Diatom) Ballistic (Firearm, Projectiles (Bullets, shots, pellets) cartridges, wads, GSR) Viscera (vomit, stomach wash, stomach, intestine, kidney, liver, spleen, brain, heart, blood, bones, teeth, hair, skin, sweat) physical evidence (glass, paint fiber, plastic, tungsten filament, broken pieces (wood, metal, bangle) button, keys, cable wires, rope ligature, coins, stamps, hardware tools. Other evidence (soil, dust, ash, smoke, cloth, cigarette buds, Cyber evidence (Data card, SIM, storage drives, mobile devices, computer systems) Miscellaneous (Odour, burnt document, hand written note, Id cards, Random objects).

**UNIT –III: Science of Reconstruction**

- History and Development of Crime Science Reconstitution, famous case study of forensic reconstructions ,Introduction to CSR , Understanding the concept of CSR, Nature and scope of, CSR, Importance and Significance of CSR, End product in reconstruction, Importance of analysis in reconstruction, scientific approach to reconstruction, Concept of Consilience, Consilient Approach to reconstruction, Concepts and techniques of logical reasoning and systematic methodology, Concepts from other disciplines, The Ryerson Method {Conceptual Adaptation from available documentation} Event Analysis { Pre-Event, Approach, Entry, Pre-Contact, Contact, Post-Contact, Exit, Post-Exit, Post-Contact} The Bevel Model, Integrated Bevel method, method for evidence, collection, documentation, analysis and synthesis, The Henry Lee Model, The Robert Ogle Model, The Consilient Method, Case study

**UNIT –IV: Field Crime Scene Reconstruction**

- Fundamental Principles of Reconstruction, analytics of data gathering from evidence, Concept of Locard's theory of transfer in reconstruction, four point base method for reconstruction -Recognition, Identification, Individualization, Reconstruction :Evidence from scene of crime. Stages in reconstruction (Data collection, Conjecture, Hypothesis formulation, Testing, Theory formation), Classification of reconstruction (Specific type of incident reconstruction, (Accident reconstruction {automobiles trains, airplanes, boat, Industrial or construction} Specific crime reconstruction {Homicide, Arson, Rape , White-collar crime ,Other} Specific events reconstruction { determination of Sequence, Direction, Position, Relational, Condition, Identity } Degree of involvement reconstruction { Total, Partial, Limited event and Specific pattern reconstruction} Specific type of physical evidence reconstruction { Pattern evidence , Shooting investigation evidence ,Serological evidence } Special areas or determinations in reconstruction{ Criminal profiling (MO, motive, psychological profiling , organized or disorganized crime scene) Scene profiling- Primary , secondary or multiple scene.

**Reading Material –**

- Bevel, T., Gardner, M. R., Practical Crime Scene Analysis and Reconstruction
- Lee, C. H., Palmbach, T., Miller, T. M., Henry Lee's Crime Scene Handbook

**M.Sc. FORENSIC SCIENCE: SEMESTER -1 (Theory Paper)**  
**PSFS 102: Forensic Medicine**

**Hours per week – 04**

**Credits – 04**

**UNIT –I: Introduction to Forensic Medicine**

- Introduction and history of forensic medicine.
- Autopsy: Introduction and classifications, legal requirements, procedure to conduct medicolegal autopsy, obscure autopsy, examination of clothing, preservation of postmortem samples, postmortem artefacts.
- Examination of mutilated bodies, decomposed bodies and fragmentary remains.
- Exhumation: Concept, legal requirements and procedure.
- Thanatology: Introduction and stages of death, suspended animation, moment of death, signs of death and changes following death, embalming, estimation of postmortem interval
- Introduction to Anthropometry

**UNIT –II: Injuries**

- Definition of injuries and laws pertaining to injuries
- Mechanical injuries: basic concepts
- Regional injuries: Head injuries: scalp, face, skull and brain; neck injuries; spinal injuries; chest injuries, abdominal injuries; injuries to the bones.
- Injuries due to physical agents: heat (heat exhaustions, heat syncope, heat fatigue, heat stroke and heat cramp), cold (definitions, symptoms and postmortem appearance), lightning (definitions, mechanism and postmortem appearance) and electrocution (definitions, symptoms and postmortem appearance).

**UNIT –III: Asphyxia**

- Introduction and classification of asphyxia, signs of asphyxia
- Hanging: definitions, classifications, cause of death and postmortem appearances
- Strangulation: definitions, classifications, cause of death and postmortem appearances
- Suffocation: definitions, classifications, cause of death and postmortem appearances
- Drowning: definitions, classifications, cause of death and postmortem appearances
- Definition, types, pathophysiology, clinical features, postmortem findings and medicolegal aspects of drowning, diatom test, Gettler test.

**Infanticide**

- Introduction and legal provisions, concepts of still birth, dead birth and live birth, cause of death: natural, accidental and criminal
- Child abuse: Battered baby syndrome and shaken baby syndrome

**UNIT –IV: Sexual offences**

- Introduction and classification: natural, unnatural and sexual perversions
- Rape: definitions and legal provisions, medical examination of victims and accused, collection and preservation of trace evidences

- Unnatural Sexual offences: Sodomy, incest, lesbianism and bestiality, examination of accused and victim, collection and preservation of trace evidences
- Sexual perversions: definitions and introduction of sadism, masochism, fetishism, transvestism, exhibitionism, voyeurism, frotteurism, necrophilia, and paedophilia.

### **Forensic Psychiatry**

- Introduction, classification of mental disorders, definitions of terms related to forensic psychiatry, such as, affect, confabulations, delirium, delusion, fugue, hallucinations, illusion and lucid interval, Mc Naughten's rule.

### **Reading Material –**

1. Rai Bahadur Jaising P. Modi, Modi's Medical Jurisprudence and Toxicology, Elsevier.
2. C. K. Parikh, Forensic Medicine and Toxicology, CBS Publishers & Distributors Pvt. Ltd., India.
3. Anil Aggrawal, APC Insight into Textbook of Forensic Medicine and Toxicology, Avichal Publishing Company.
4. R.K. Sharma, Concise Textbook of Forensic Medicine & Toxicology, Elsevier, India.
5. Dr. K. S. N. Reddy- The essential of Forensic Medicine & Toxicology, Published by K.Saguna Devi, Hyderabad.
6. Dr. Apurba Nandy- Principles of Forensic Medicine, New Central Book Agency (P) ltd. Calcutta.

**M.Sc. FORENSIC SCIENCE: SEMESTER -1 (Theory Paper)**

**PSFS 103: Digital and Cyber Forensics – I**

**Hours per week – 04**

**Credits – 04**

**UNIT –I:**

**Information security and Network Forensics:**

**Information security:** Domains, Common Attacks, Impact of Security Breaches. Loss related to cyber crime, Protecting Critical Systems (Information Risk Management, Risk Analysis etc) Information Security in Depth Physical security (Data security Systems and network security)

**Database Security:** Security requirements of Database, Reliability and integrity, Sensitive data, Interface, Multilevel database, Proposals for multilevel security.

**UNIT –II:**

**Network Security:** Security Services: Authentication, Confidentiality, Integrity, Non-repudiation, Availability Services.

Groups, Rings, and Fields, Modular Arithmetic, The Euclidean Algorithm, Finite Fields of The Form  $GF(p)$ , Finding the Multiplicative Inverse in  $GF(p)$ . Symmetric Key encryption, Symmetric block Encryption Algorithm, Stream Cipher and RC4, Key distribution.

Public key Cryptography and Message Authentication, SHA and HMAC, Public key Cryptography Algorithms, RSA etc, Digital Signature.

Network based Intrusion Detection and Prevention Systems, Host based Intrusion Prevention System.

**UNIT –III:**

Network Security applications:

Authentication Application: Kerberos, X.509 Authentication Service, Public – Key Infrastructure, Electronic Mail Security: PGP, S/MIME, IP security : Overview , Architecture, Authentication header, Encapsulating Security Payload, Combining Security Association, Key Management. Web Security: SSL, TSL, SET. Concept of SNMP.

**UNIT –IV:**

**Virtualization and Network Forensic:**

**Introduction :** Physical Machines, How Virtualization Works, Hypervisors, Main Categories of Virtualization , Benefits of Virtualization, Cost of Virtualization

**Server Virtualization :** What Is Server Virtualization? Differences between Desktop and Server Virtualization, Common Virtual Servers

**Desktop Virtualization :** What Is Desktop Virtualization? Common Virtual Desktops, Virtual Appliances and Forensics , Virtual Desktops as a Forensic Platform

### **Reading Material -**

1. Virtualization and Forensics By Diane Barrett, Greg Kipper
2. Virtualization Security Protecting virtualized environment By Dave Shackleford
3. Scene of Cyber Crime-Computer\_forensics\_handbook, Debra Littlejohn Shinder and Ed Tittel , Syngress Publishing,
4. Security in Computing, C. P. Pfleeger, and S. L. Pfleeger, Pearson Education
5. Network and System Security by John R. Vacca, Syngrees Publication
6. Cryptography And Network Security: Principles and practice by Stallings,
7. Computer Security: Art and Science by Matt Bishop, Pearson Education.
8. Incident response and computer forensics by Kevin Mandia, Chris Prosise and Matt Pepe,, *McGraw Hill Publication*
9. Handbook of Information Security Management by Micki Krause, Harold F. Tipton, Vol 1-3 CRC Press LLC, 2004.
10. George Kurtz, "Hacking Exposed by Stuart Mc Clure, Joel Scrambray, Tata McGraw-Hill, 2003

**M.Sc. FORENSIC SCIENCE: SEMESTER -1 (Theory Paper)**

**PSFS 104: Cyber Crime and Protection of Personal Data in Cyberspace**

**Hours per week – 04**

**Credits – 04**

**UNIT –I:**

**Indian Cyber and Data Protection Law**

- Conventional Crime and Cyber Crime: Classification and Distinction
- Cyber Crime in India under IT Act : Penalties & Offences Under IT Act
- Establishment of Authorities under IT Act : Controller, Certifying Authorities, Cyber Regulation Appellate Tribunal, Adjudicating officer
- Investigation of Cyber Crimes in India : Agencies for Investigation, Procedures for Evidence Collection and Seizure in digital mediums
- Right to Privacy and Data Theft under Indian Law
- Legal Measures for Protection of Personal Data under Draft on Right to Privacy Bill
- Comparison and Critique of Indian Personal Data Protection Law

**UNIT –II:**

**Role of OECD for protection of personal data**

- Organization for Economic Cooperation and Development
- (OECD) Guidelines on the protection of privacy and trans-border flow of personal data, 1980
- OECD guidelines for protecting consumers from fraudulent and deceptive commercial practices across borders, 2003
- Organization for Economic Cooperation and Development (OECD) Guidelines for the security of information systems and networks 2002
- OECD Guidelines for electronic authentication, 2007

**UNIT –III:**

**Protection of Personal Data and EU Principles**

- The European Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data, 1981. (ETS No. 108, Popularly Known as *Council of Europe Convention 108*)
- The protection of individuals with regard to the processing of personal data and on the free movement of such data. (EU Directive 95/46/EC of 24 October 1995)
- Asia-Pacific Economic Cooperation (APEC) Privacy Framework, 2004

**UNIT –IV:**

**Cyberspace Regulation and Role of United Nation**

- UN General Assembly, Guidelines for the Regulation of Computerized Personal Data Files, 14 December 1990
- United Nations Convention on the Use of Electronic Communications in International Contracts. 2005



### **Reading Material –**

1. The Indian Cyber Law by Suresh T. Vishwanathan- Bharat Law House New Delhi
2. Guide to Cyber and E- Commerce Laws by P.M. Bukshi and R.K. Suri- Bharat Law House, New Delhi.
3. Guide to Cyber Laws by Rodney D. Ryder- Wadhwa and Company, Nagpur
4. The Regulation of Cyberspace by Andrew Murray, 2006- Routledge –Cavendish
5. The Indian Cyber Law by Suresh T. Vishwanathan- Bharat Law House New Delhi
6. Guide to Cyber and E- Commerce Laws by P.M. Bukshi and R.K. Suri- Bharat Law House, New Delhi
7. Guide to Cyber Laws by Rodney D. Ryder- Wadhwa and Company, Nagpur
8. The Regulation of Cyberspace by Andrew Murray, 2006- Routledge –Cavendish
9. International Trade Law by Indira Carr, Peter Stone, 4<sup>th</sup> edition, 2010, Page 103 to 136
10. Online Dispute Resolution: Challenges for Contemporary Justice by Gabrielle Kaufmann-
11. Kohler, Thomas Schultz, 2004, pages 5 to 58, 67 to 81, 108 to 120, 131 etc.
12. Cyber Consumer Law and Unfair Trading Practices: Unfair Commercial Practices By Cristina Coteanu page 87-113.
13. Cyber Consumer Law and Unfair Trading Practices: Unfair Commercial Practices By Cristina Coteanu Page- 1- 11, 45 to 68, 137 to 150
14. Online Dispute Resolution for Business: B2B, ECommerce, Consumer, Employment, Insurance and other Commercial Conflict, by Colin Rule, Josse bass, 2002. Page- 203 to 214

**M.Sc. FORENSIC SCIENCE: SEMESTER - 1 (Lab Course)**  
**PSFS P101: Lab Course -1**

**Hours per week – 08**

**Credits – 04**

**(Minimum Twelve Experiments)**

1. Statistical analysis of latest NCRB Report, evaluation of crime rate of Maharashtra state and country with traditional and modern analytical tools.
2. Practical drill of Crime scene management (Barricade, Documentation, Co-ordination, logistics, resource, manpower, chain of custody, evidence handling, packaging forwarding, sealing and transportation)
3. Practical investigation at Crime scene (D-walk, Survey, Search, evidence recovery, preservation, data gathering)
4. Practical Crime Scene Photography (Scene Photography {Angular, Bird eye view, Close-up} Panoramic (Horizontal and Vertical view) Evidence Photography (Object) {under natural light, under light source} Special evidence photography (pattern evidence) closing photography.
5. Practical Scene videography (Clockwise and anti-Clockwise videography) special segment videography, CCTV video analysis.
6. Practical Crime Scene sketching (Method of sketching {Indoor and Outdoor sketch} Rough and Final Sketching, hand sketching, Software base sketching)
7. Recovery and Collection of Forensic evidence (Biological, Fingerprints, Ballistic)
8. Practical field analysis and spot testing (spot kits)
9. Crime scene evidence examination under different light source UV {254,364,345nm} IR, Poise light, Anti strokes, fluorescence, and high magnification,
10. Identification and separation of same color evidence with the same color background using different color filters and bandpass.
12. Practical Crime Scene Reconstruction {Ryerson Method/ Bevel Model/ Henry Lee Model}
13. Practical case study with Crime scene reconstruction using digital tool and MAT lab.
14. Reconstruction in case of Suicide, Gun Shot and Vehicular Accident.
15. Practical based on reconstruction of pattern evidence (BSP, Burning Pattern, Fracture Pattern).
16. Identification of various changes in the corpse on postmortem examination in different cases.
17. Determination of cause of death on postmortem examination of a corpse.
18. Collection and preservation of evidences from a corpse.
19. Identification and drawing medico-legal inference from various specimen of injuries e.g. contusion, abrasion, laceration, head injury and fracture of a bone.
20. Study of various case studies related to injuries.

**M.Sc. FORENSIC SCIENCE: SEMESTER - 1 (Lab Course)**  
**PSFS P102: Lab Course -2**

**Hours per week – 08**

**Credits – 04**

**(Minimum Twelve Experiments)**

1. Installation of VMWare virtual machine.
2. Installation of VirtualBox virtual machine.
3. Installation of windows operating system on virtual machine
4. Installation of Linux operating system on virtual machine
5. Creating virtual network
6. Configuration of windows web server
7. Configuration on Linux server
8. Analysis of traces of Virtual Machine using – Registry Analysis
9. Analysis of VMWare traces on the system
10. Analysis of external device
11. Analysis of prefetch file
12. Data Carving
13. Investigating Dead Virtual Environments
14. Implementing Browser Security
15. Implementing E-Mail Security
16. Implementing Web Server Security
17. Securing Windows Computers
18. Securing a Windows server Network
19. Securing UNIX/Linux Operating Systems
- 20. Securing Wireless network**

**M.Sc. FORENSIC SCIENCE: SEMESTER- II (Theory Paper)**  
**PSFS 201: Fingerprint and Questioned Documents**

**Hours per week – 04**

**Credits – 04**

**UNIT –I:**

**History, Introduction and Classification of fingerprints**

- Early history of fingerprint science
- Fingerprints as forensic evidence
- Embryological development of friction ridges
- Morphology of the skin
- Uniqueness and Permanence
- Types of fingerprint patterns: Arches, Loops and Whorls
- Class and individual characteristics of fingerprints
- Introduction to Poroscopy and Edgeoscopy
- Fingerprint Classification systems
- Henry's Classification and Extension of Henrys Classification
- Batley's single digit classification
- NCIC Classification

**UNIT –II:**

**Types of Fingerprints, Collection and Processing**

- Latent, Patent and Plastic prints
- Composition of sweat: Eccrine, Apocrine and Sebaceous glands
- Search methods: Forensic Light sources
- Physical processing methods: fingerprint powder, magnetic powder, Iodine fuming
- Chemical Processing methods: Super glue fuming, Ninhydrin, DFO, graphite powder  
Physical Developer, Silver Nitrate, Metal Deposition, Laser technology.
- Bloody fingerprints and other development methods
- Collection of specimen prints: Rolled and plain prints
- AFIS: History of AFIS, Live scan, Types of search.

**UNIT –III:**

**Questioned document examination**

- Handwriting: Writing systems, Principle of handwriting identification, copy book form, Deviations from copy book form.
- Development of individuality in handwriting classification of characteristics: Class and individual characteristics, National characteristics in handwriting, accidental characteristics in handwriting.
- Various types of characteristics contributed due to (a) Element of style as Arrangement, connection, design, size and relative size, slant, spacing (b) elements of execution as Abbreviations, Alignment, Commencement and termination, diacritic and punctuation, embellishment, legibility, pen control leading to pen scope, pen pressure, pen lift, pen

pause, writing movements, line quality.

**UNIT –IV:**

- Comparison of handwriting: Natural Variations in handwriting range of variations (consistency), fundamental divergences in handwriting.
- Interpretation of these two in relation of identification of handwriting, individual characteristics, significant individual characteristics, relative weightage of characteristics of handwriting, consideration of various writing instruments used in writing.
- Forgeries of Signature: Classes of forgery and their examination, Disguise in handwriting, anonymous letters, Handedness and ambidexterity, examination of numeral and initials.
- Photography of questioned documents

**Reading Material –**

1. Saferstien : Forensic Science, Handbook, Vol. I, II & III, Prentice Hall Inc. USA.
2. Hilary Moses Daluz, Fundamentals of Fingerprint Analysis, CRC Press, 2014.
3. H.C. Lee and R.E. Gaensslen eds “Advances in Fingerprint Technology”, second ed. New York: CRC Press, 2001
4. Max M Houck, Forensic Fingerprints, Academic Press, 2016
5. Huber, A. R. and Headride, A.M. (1999) : Handwriting identification : facts and fundamental CRC LLC
6. 2. Ellen, D (1997) : The scientific examination of Documents, Methods and techniques. 2nd ed., Taylor & Francis Ltd.
7. 3. Morris (2000) : Forensic Handwriting Identification (fundamental concepts and Principals)
8. 4. Harrison, W.R. : Suspect Documents & their Scientific Examination, 1966, Sweet & Maxwell Ltd., London.
9. 5. Hilton, O : The Scientific Examination of Questioned Document, 1982, Elsaevier North Holland Inc., New York.
10. 6. Sulner, H.F. : Disputed Document, 1966 Oceana Publications Inc., New York.
11. 7. Saxena’s : Saxena’s Law & Techniques Relating to Finger Prints, Foot Prints & Detection of Forgery, Central Law Agency, Allahabd (Ed. A.K. Singla).
12. 8. Quirke, A.J. : Forged, Anonymous & Suspet Documents, 1930, Reorge Rontledge & Sons Ltd., London.
13. 9. Osborn, A. S. : Questioned Documents 1929, Boyd Printing Co., Chicago.
14. 10. Levinson, J: Questioned Documents, 2000, Academic Press, Tokyo.
15. 11. Kelly, J.S and Lindblom, B.S: Scientific Examination of Questioned Documents, 2006, Taylor & Francis, New York.

**M.Sc. FORENSIC SCIENCE: SEMESTER- II (Theory Paper)**  
**PSFS 202: Data Processing in Forensic Science**

**Hours per week – 04**

**Credits – 04**

**UNIT I: Statistical Analysis in Forensic Science**

- Data and its types
- Presentation of data: frequency distribution, histogram, polygon, pie chart
- Measure of central tendency: mean, median and mode
- Measure of dispersion: range, standard deviation, variance and standard error
- Correlation and regression analysis
- Introduction to probability theory: basic terms, addition and multiplication theorem, Baye's theorem and its application in court, likelihood ratio
- Normal distribution and its parameter
- Test of hypothesis: introduction and concept of hypothesis (null and alternate), Types of errors, critical region, level of significance, test for small and large samples: z test, t test, chi square test, f test and ANOVA
- Errors in interpretation
- Databases in forensic science

**UNIT II: Research Methodology:**

- Introduction to Research Methodology
- Definition and types of research
- Research process: Defining research problem, review of literature, formulation of hypothesis, research design, collection and analysis of data, interpretation and writing a report
- Scientific Writing: Research proposal, thesis/dissertation, research and review articles
- Components of research report: Title, acknowledgements, introduction, review of literature, aim and objectives, material and methods, result and discussion, conclusion and future work, bibliography/references, appendices, glossary
- Presentation of research: Oral presentation, poster presentation, simulation exercises
- Plagiarism: Definition, types and regulation

**UNIT III: Quality Assurance and Quality Control**

- ISO/IEC: 17025- Need and Scope
- Managements requirements: General requirements, Document Control, Internal Audit
- Technical Requirements: General, Personnel, Standardization and calibration of instruments, Method Validation, Estimation of uncertainty of measurement, Reports
- Proficiency testing: Definition, scope and procedure
- QA and QC: Definition, Scope, Difference and importance in Forensic Science

Laboratories

- Accreditation: Definition, Scope, Benefits, Preparation and eligibility, Process, Modifications, Complaints and Appeals

**UNIT IV: Presentation of evidence, Report writing and Courtroom Skills:**

- Courtroom procedures: Civil and Criminal procedure rules
- Courtroom presentation skills: Role and legal responsibilities of Forensic expert in Judicial system, Court Craft: Appearance, behavior of the expert in the court, reliability of procedures followed in the analysis of exhibits, confidence of the expert in defending the report in the court, Presentation of evidence in court based on statistics, examination in chief and cross examination, Recognition and elimination of subjectivity in Forensic Scientific investigations.
- Report writing of various evidences
- Forensic Case studies: Assessment, interpretation and reporting of evidences

**Reading Material –**

1. Statistical Analysis in Forensic Science: Evidential Values of Multivariate Physicochemical Data By Grzegorz Zadora, Agnieszka Martyna, Daniel Ramos, Colin Aitken
2. Introduction to Statistics for Forensic Scientists By David Lucy
3. Visweswara Rao. K: Biostatistics, A Manual of Statistical Methods for Use in Health, Nutrition & Anthropology.
4. Sokal, R.R & Rolf, F.J: Biometry, Principles & Practices of Statistics in Biological Research 26. Rao, C. R Advanced Statistical Methods in Biometric Research.
5. C.G.G. Aitken and D.A. Stoney; The use of statistics in Forensic Science, Ellis Harwood Limited, England (1991)
6. Creswell W. John, Research Design: Qualitative, Quantitative and Mixed Methods Approaches 4th Edition, Sage Publications (2014)
7. G.C.Ramanmurthy. Research Methodology, Dreamtech press (2011)
8. Peter Pruzan, Research Methodology: The Aims, Practices and Ethics of Science, Springer (2016)
9. Sean Doyle, Quality Management in Forensic Science, Elsevier Science, 2018

10. Maciej J. Bogusz, Quality Assurance in the Pathology Laboratory: Forensic, Technical, and ethical aspects, CRC press, Taylor and Francis group, 2011
11. Rao, M.B.: Checklists and Frequently asked Questions in Forensic Science and Forensic Medicine, Published by S.V.P. National Police Academy, Hyderabad (2014)
12. Rao, M.B.: Scientific Aids to Crime Investigation, published by S.V.P. National Police Academy, Hyderabad (2016).
13. ISO 17025: 2017 Quality manual and procedures
14. Indian Penal Code
15. Criminal Procedure Code
16. Indian Evidence Act.



**M.Sc. FORENSIC SCIENCE: SEMESTER- II (Theory Paper)**  
**PSFS 203 : Digital and Cyber Forensics - II**

Hours per week – 04

Credits – 04

**UNIT –I:**

**Basic of E-Discovery :**History and development of e-discovery, Overview of technology at issue in e-discovery matters, including distinction between data and metadata, General framework of e-Discovery, Legal aspects of e-Discovery, E-discovery industry, Electronic Discovery Reference Model Project, Developing “data maps” for enterprises, Technology tools for archiving and retrieving Electronically Stored Information.

**UNIT –II:**

**E-Discovery Investigation :** Technical anatomy of e-mail messages and e-mail systems, Enterprise class email vs. private email systems such as G-Mail, Web 2.0 Technologies , HotMail, Yahoo! Etc. Collecting, processing ,reviewing and producing e-mail messages, E-discovery of instant messaging, Discovery of online information assets like Facebook, web sites, wikis and other web 2.0 technologies, investigatory opportunities using computer forensic(recovering deleted files , retrieving internet activity, file fragment analysis etc .

**UNIT –III:**

**Live Forensic :** live response, volatile memory analysis, volatility, PTFinder, the impact on investigated system, memory image analysis, recovering cached and internet artifacts , internet browsing artifacts, volatile data acquisition, volatile forensic method, runtime disk explorer, logical acquisition, memory dump analyzer, crash dump analyzer, cryptanalysis, MAC times, metadata issues, analyzing file time stamps

**UNIT –IV:**

**Wireless Networks and Internet Forensics.**

**Wireless Networks:**

Wireless Infrastructure, Difference between wired and wireless networks. Wireless Transmission, Telecommunication Systems Wireless LAN: IEEE 802.11 (Architecture Physical Layer MAC Layer Addressing mechanism) Cellular Telephony: Frequency reuse principal, Transmitting- Receiving Handoff roaming, First Second and Third Generation. Satellite Networks: Orbits, Footprints, three categories of satellites (GEO, MEO, LEO)

**Internet Forensic:**

Obfuscation: Anatomy of URLs, IP Addresses in URLs, Usernames in URLs, Encoding the Entire Message, Similar Domain Names, Making a form look like a URL, Bait and Switch-URL Redirection, JavaScript, Browsers and Obfuscation  
Websites: Capturing Web Pages, Viewing HTML Source, Comparing Pages, Non-Interactive Downloads Using wget, Mapping out the entire website, Hidden Directories, In Depth Example-Directory Listing, Dynamic WebPages, Filling Out Forms, In depth Example-Server side Database , Opening the Black Box Web Servers: Viewing HTTP Headers, Understanding Header Information, Cookies,Redirection, Web Server Statistics, Controlling HTTP Headers

**Reading Material -**

1. e-Discovery For Dummies Linda Volonino and Ian Redpath Wiley Publication Inc

2. Techno Security's Guide to E-Discovery and Digital Forensics Jack Miles, Syngress Publishing, Inc.
3. Arkfeld's Best Practices Guides to Electronic Discovery and Evidence by Michel R. Arkfeld, Law Partner Publishing
4. <http://ediscoveryservicesinindia.blogspot.in/>
5. Data Communication and Networking by Forouzan, McGraw Hill
6. Mobile Communication by Jochen Schiller, Addison Wesley Pearson Education
7. Internet Forensics Using Digital Evidence to Solve Computer Crimes by Robert Jones, O'Reilly Media Publication
8. Digital Forensics with Open source Tools by Cory Altheide, Harlan Carvey,, Syngress Publication
9. Art of memory forensic by Michael Hale Ligh, Wiley publication

**M.Sc. FORENSIC SCIENCE : SEMESTER- II (Theory Paper)**

**PSFS 204 : E-commerce, E-Governance and Online Dispute Resolution**

**Hours per week – 04**

**Credits – 04**

**UNIT –I:**

**E-Commerce and E-Governance - I**

- International Organizations involved in E-Commerce and their Roles : ICANN, OECD, WIPO, WTO, TRIPS, and UNICITRAL
- Meaning and types of e-commerce and electronic marketplace and online marketing
- E-Commerce and E-Governance in India: Evolution of IT Act; Genesis and Necessity, Digital and Electronic Signature, E-Commerce, E-Governance Concept and Practicality, E-Commerce and E-Taxation Issues and Provisions
- UNICITRAL Model Law: Model Law on Electronic Commerce 1996 and Model Law on Electronic Signatures 2001

**UNIT –II:**

**Unfair trade Practices in India**

- Concept of Unfair Trade Practices types and provisions, penalties and offences under various laws in India
- Online Misleading Advertisements, False Representation, False Offer of Bargain Price, Free Gifts Offer and Prize Schemes, Non-Compliance of Prescribed Standards, Hoarding, Destruction, Etc
- Advertising Regulating Authorities in India
- Standardization of Electronic Contract
- Products and services banned from advertising
- Consumer Misleading Practices and Case Studies
- Laws Protecting Consumer and Governing Media in India

**UNIT –III:**

**Alternate Dispute Resolution (ADR) and Global Justice System Online Dispute Resolution (ODR)**

- Concept and types of ADR and Difference Between ADR and ODR
- Online Dispute Resolution (ODR)
- Advantages and Method of online dispute resolution
- Procedural setup for ADR schemes
- Driving Force behind ODR and its core regulatory Principles
- ICANN's UDRP and Case Studies
- Other transnational ODR Systems
- Current issues in ODR

**UNIT –IV:**

**Intellectual Property Rights in Digital Medium**

- Concept of Trademark and Domain Name
- Domain Names and Trademark Disputes : Cyber Squatting and Reverse Hijacking
- Concept of Copyright and Patent in Cyberspace
- Copyright in Digital Medium
- Copyright in Computer Programs

- |   |
|---|
| <ul style="list-style-type: none"><li>• Copyright and WIPO Treaties</li><li>• Laws related to intellectual property rights in India</li></ul> |
|---|

**Reading Material –**

1. International Guide to Privacy, By Jody R. Westby, American Bar Association. Section of Science & Technology Law, Pages 82 to 100)
2. OECD Guidelines on the Protection of Privacy and Trans-border Flows of ...By OECD, 2001, Page- 11 to 21.
3. Data Privacy in the Information Age by Jacqueline Klosek, 2000, Pages 27 to 48.  
Global Privacy Protection: The First Generation by James B. Rule, G. Graham William Greenleaf
5. The United Nations Convention on the Use of Electronic Communications in International Contracts by Amelia H. Boss, Wolfgang Kilian
6. The Law of Electronic Commerce by Jane K. Winn, Benjamín Wright, 2004.
7. Internationalization of E-Commerce, an electronic Journal for US Dept of State Volume 5 no.2, 2000.
8. E-commerce: an Indian Perspective, 3<sup>rd</sup> edition by P. T. Joseph S. J., 2008
9. Law Relating to Computers Internet & E-Commerce by Nandan Kamath
- 10 Information Technology Law and Practice, by Vakul Sharma.
11. E-Commerce: Law and Jurisdiction : The Comparative Law Yearbook ..., Issue 2002  
By Dennis Campbell, Susan Woodley

**M.Sc. FORENSIC SCIENCE : SEMESTER- II (Lab Course )**  
**PSFS P201: Lab Course -3**

**Hours per week – 08**

**Credits – 04**

**(Minimum Twelve Experiments)**

1. Taking rolled and plain fingerprints, palm prints
2. Examination of Fingerprints using various light sources
3. Identification and classification of fingerprints Patterns
4. To perform Henrys Classification (Primary, Secondary, Single digit and AFIS classifications)
5. Identification of Class and Individual characteristics of fingerprints
6. Development of latent prints using powder method
7. Development of latent prints using silver nitrate
8. Development of latent prints using ninhydrin
9. Development of latent prints using Iodine fuming
10. To study Poroscopy and Edgescopy
11. Laboratory Equipments : - Working and handling of Stereo Zoom Microscopes , Comparison Microscope , Video Spectral Comparator, Electrostatic Detection Apparatus, UV – Vis spectroscopy, TLC.
12. Identification of General Characteristics of Handwriting.
13. Identification of Individual Characteristics of Handwriting.
14. Study of Natural variations in Handwriting.
15. Study of disguised writing.
16. Detection of simulated forgery.
17. Detection of traced forgery.
18. Examination of forged documents using VSC.
19. Examination of alteration, erasures, overwriting, additions and obliteration in numerals.
20. Study of handwriting on different surfaces
21. Study of handwriting using different writing instruments.
22. Reconstruction of torn sheets of paper.
23. Examination of creases and folds and determination of sequence of strokes.
24. Examination of paper.
25. Examination of inks
26. Photography of questioned document
27. To apply various steps research methodologies by conduction of small pilot survey on the given topic.
28. Calibration of instruments
29. Writing of Forensic Report on various evidences
30. Practical based on Hypothesis testing
  - A. t-tests
  - B. chi square tests
  - C. Regression analysis
31. Practical based on parametric tests
32. Practical based on Likelihood ratio and Bayesian Approach'
33. Practical based on Probability

**M.Sc. FORENSIC SCIENCE: SEMESTER-I1 (Lab Course)**

**PSFS P202: Lab Course - 4**

**Hours per week – 08**

**Credits – 04**

**(Minimum Twelve Experiments)**

1. Study of wireless devices
2. Study of wireless networks and wireless network analysis.
3. Understanding dynamic and static pages, Viewing HTML Source and HTTP Headers, Understanding Header Information
4. Working with wireshark for Network analysis.
5. Studying of packets and packet formats.
6. Log Collections and analysis.
7. Live Memory Forensic -1
8. Live Memory Forensic -2
9. Network evidence collection offline and online.
10. Study of metadata
11. Study of Data maps
12. Email Analysis
13. Internet Analysis
14. Recovering deleted files
15. Retrieving internet activity
16. File fragment analysis
17. Recovering cached and internet artifacts
18. Facebook profile data acquisition and documentation.
19. Study of E-mail Headers.