JSPM University Pune

Faculty of Health Sciences

School of Forensic Sciences

JSPM UNIVERSITY

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NEP aligned Syllabus

for

M.Sc. (Forensic Science)

(Effective from AY: 2023-24)

JSPM University
FACULTY OF HEALTH SCIENCES
Wagholi, Pune-412207

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FACULTY OF HEALTH SCIENCES
JSPM UNIVERSITY PUNE

JSPM UNIVERSITY PUNE
Recognized by the UGC u/s 2 (f) of UGC Act 1956 and enacted by the
State Government of Maharashtra - JSPM University Act, 2022 (Mah. IV of 2023)

M.Sc. (Forensic Science)

Semester - I

Level – 6.5

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs. per week)				Examination and Marking Scheme			Credits
				L	T	P	EL	TH	PR	OR	
01	PCC	230HFGM01_01	Advanced Instrumental Methods	2	1	-	-	100	-	-	3
02	PCC	230HFGM02_01	General Forensic Science and Crime Scene Investigation	2	1	-	2	100	-	-	3.5
03	PCC	230HFGM03_01	Criminology	2	1	-	-	100	-	-	3
04	MMC	230HFGM11_01	Cyber Security and Privacy	2	-	-	-	-	50	50	2
05	SEC	230HFGM12_01	Body Language and Lie Detection	2	-	2	-	-	50	50	3
06	VSC (HSMC)	230IDCB01_01	Design Thinking and Creativity	1	-	-	2	-	-	50	1.5
07	AEC (HSMC)	230UENM01_01	Communicative English for Professionals	1	-	2	-	50	-	-	2
08	RMC	230IRMM01_01	Research Methodology	2	-	-	-	50	-	-	2
09	LC	230HFGM15_01	General Forensic Science and Crime Scene Investigation Lab	-	-	2	-	-	50	-	1
10	LC	230HFGM16_01	Advanced Instrumental Methods Lab	-	-	2	-	-	50	-	1
Total Academic Engagement and Credits				**14**	**3**	**8**	**4**	**400**	**200**	**150**	**22**
				25			**4**	**750**			

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Semester - II

Level – 6.5

Sr. No.	Course Type	Course Code	Course Name	Teaching Scheme (Hrs. per week)				Examination and Marking Scheme			Credits
				L	T	P	EL	TH	PR	OR	
01	PCC	230HFGM04_02	Forensic Chemistry, Toxicology and Medicine	2	-	-	-	100	-	-	2
02	PCC	230HFGM05_02	Forensic Biology and Serology	2	-	-	2	100	-	-	2.5
03	PSBC	230HFGM06_02	Intellectual Property Rights	3	-	-	-	100	-	-	3
04	MMC	230HFSB10_02	C and C++ Programming Languages	2	-	-	-	-	50	50	2
05	SEC	230HFGM13_02	DNA Forensics	2	-	2	-	-	50	50	3
06	VSC (HSMC)	230IINB02_02	Innovation	1	-	-	2	-	-	50	1.5
07	AEC (HSMC)	230UENM02_02	Business Communication	1	-	2	-	50	-	-	2
08	RMC	230IRMM06_02	Research in Forensics	2	-	-	-	50	-	-	2
09	LC	230HFGM17_02	Forensic Chemistry, Toxicology and Medicine Lab	-	-	2	-	-	50	-	1
10	LC	230HFGM18_02	Forensic Biology and Serology Lab	-	-	2	-	-	50	-	1
11	IITP/FP/CEP	230HFGM23_02	Internship/Field Project/Community Engagement Programme	4 to 6 weeks				-	-	50	2
Total Academic Engagement and Credits				**15**	**-**	**8**	**4**	**400**	**200**	**200**	**22**
				22			**4**	**800**			

Note: A **Postgraduate Diploma** will be awarded if a student exits after first year.
For Exit at the end of first year the student must complete: (Total credits = 8)
a) An internship/OJT of 8 - 10 weeks (4 credits)
b) Additional Course 1 (4 credits) (Vocational Skill Course (VSC)/Skill Enhancement Course (SEC))

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: PCC	**Course Title: Advanced Instrumental Methods**	
Course Code: 230HFGM01_01	**Teaching Scheme: (Hrs./Week)**	**Examination Scheme:**
Credits: 3	**Lecture (L): 2 Tutorial (T): 1 Practical (P): 0 Experiential Learning (EL): 0**	**Theory (TH): 100 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- To make students understand the basic & advances in analytical instrumental techniques or methods for identification, characterization & quantification of different exhibits found at crime scene.
- The students will be able to learn different destructive and non-destructive spectroscopic techniques along with their use & forensic significance.
- To will also gain knowledge about principles & working of different spectroscopy techniques.

Course Outcomes: On completion of the course, learner will be able to –

CO1: The basic concept of EMR and its application in forensic analysis.
CO2: Comprehend the significance of wave and quantum properties of EMR.
CO3: Understand different techniques for identification, characterization & quantification of forensic exhibits.
CO4: Understand the principles & working of spectroscopic techniques used for analysis of forensic specimens.
CO5: To differentiate between destructive and non-destructive techniques in forensic analysis.
CO6: Comprehend the principle, instrumentation, and applications of separation techniques.
CO7: Understand the principle and applications of bioanalytical techniques.

Course Contents

Unit I	**Spectroscopy-I**	**(8 Hrs)**

Electromagnetic radiation (EMR), Wave and quantum properties of EMR, Atomic and Molecular spectra, UV-Visible Spectroscopy: Principle, instrumentation, and forensic applications		
Unit II	**Spectroscopy-II**	**(8 Hrs)**
IR-Spectroscopy: Principle, instrumentation, and forensic applications, FT-IR: Principle, instrumentation, Raman Spectroscopy: Principle, instrumentation, and forensic applications		
Unit III	**Spectroscopy & Separation Techniques**	**(7 Hrs)**
Mass Spectroscopy: Principle, instrumentation, and forensic applications, Introduction to chromatography and principle of separation: adsorption, partition, ion exchange, size-exclusion		
Unit IV	**Separation Techniques-I**	**(7 Hrs)**
Paper Chromatography: principle, types, method, and forensic applications, TLC: principle, method, and forensic applications, HPTLC: principle, instrumentation, and forensic applications		
Unit V	**Separation Techniques-II**	**(8 Hrs)**
HPLC: principle, instrumentation, and forensic applications, GC: principle, instrumentation, and forensic applications, Hyphenated Techniques: LC-MS, GC-MS		
Unit VI	**Introduction to Microscopy**	**(7 Hrs)**
Microscopy: Basic concepts of microscopy, simple and compound microscopes, Comparison Microscope, Stereo-microscope, Polarizing Microscope.		

Learning Resources

References Books:

1. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, Principles of Instrumental Analysis, Cengage Learning
2. Hobart H. Willard, Lynne Lionel Merritt, John Aurie Dean, Frank A. Settle, Instrumental Methods of Analysis, CBS Publishers.
3. Suzanne Bell and Keith Morris, An Introduction to Microscopy, CRC Press
4. Abhilasha Shourie, Bioanalytical Techniques, The Energy and Resources Institute
5. Kemp, W. Organic Spectroscopy 3rd ed.PALGRAVE: New York; (1991).
6. Willdard, H.H., Merritt, L.L. and Dean, J.A. Instrumental Methods of Analysis 5th ed. Van Nostrand:New York; (1974).
7. Settle,F.A. Handbook of Instrumental Techniques for Analytical Chemistry. Prentice Hall: (1997).
8. Stahl, E. Thin Layer Chromatography: A Laboratory Handbook. Springer: Berlin; (1969).
9. Jickells, S. and Negrusz, A. Clarke's Analytical Forensic Toxicology. Pharmaceutical Press: (2008).
10. Houck, M.M. Fundamentals of Forensic Science. Academic Press: (2015).
11. Skoog, D.A., West, D.M. and Holler, F.J. Fundamentals of Analytical Chemistry 6th ed. SaundersCollege Publishing: (1996).
12. Robinson, J.W. Undergraduate Instrumental Analysis. Marcel Dekker: New York;

(1987).
13. Chatwal, G.R. and Anand, S.K. Instrumental Methods of Chemical Analysis 5th ed. Himalaya Publishing: Bombay;(2019)
14. Mozayani, A. and Noziglia, C. Forensic Laboratory Handbook Procedure and Practice. Humana Totowa:New Jersey; (2011).
15. DFS Manual, 2005
16. Teotia, A.K. and Pal, R. Practical Aspects of Forensic Chemistry. Selective & Scientific Books: NewDelhi; (2013).

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: PCC	**Course Title: General Forensic Science and Crime Scene Investigation**	
Course Code: 230HFGM02_01	**Teaching Scheme: (Hrs./Week)**	**Examination Scheme:**
Credits: 3.5	**Lecture (L): 2** **Tutorial (T): 1** **Practical (P): 0** **Experiential Learning (EL): 2**	**Theory (TH): 100 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- To make students acquainted about the basics of Forensic Science.
- To build students for performing crime scene investigation.
- To make students familiar with physical evidences and their forensic significance.
- To acknowledge students with the legal provisions related to Forensic Science.

Course Outcomes: Students completing the course will be able to:

CO1: Understand the laws and principles and various branches of Forensic Science.
CO2: Understand the history and development of Forensic Science.
CO3: Explain the working of Forensic Science Laboratories and Criminal Justice System.
CO4: Identify and define crime scene, physical evidences and their importance.
CO5: Demonstrate an ability to manage and investigate the crime scene.
CO6: Apply various scientific techniques in crime scene investigation.
CO7: Explain forensic significance of impression and trace evidences.
CO8: Understand the various legal provisions related to Forensic science.

Course Contents

Unit I	**Introduction to Forensic Science**	**(9 Hrs)**

Introduction and Definition of Forensic Science, Laws and principles of Forensic Science, History and development of Forensic Science (global and Indian perspective), Specific contribution of scientists in the field of Forensic Science, Branches of Forensic Science.

Unit II	**Forensic Science Laboratories and Criminal Justice System**	**(9 Hrs)**

Directorate of Forensic Science Services and Forensic Science Laboratories in India, Organizational set-up of Forensic Science Laboratory, Function and responsibility of forensic scientists, Role of FSL in criminal investigation, Ethics of Forensic Science, Criminal Justice System: Definition and component, structure and functions of law enforcement agencies (police), structure and functions of courts, hierarchy and powers of the court and structure and functions of corrections.

Unit III	**Crime Scene and Physical Evidences**	**(9 Hrs)**

Definition of crime scene, Classification of crime scene: indoor & outdoor, primary & secondary, macroscopic & microscopic crime scene, Significance of crime scene, Corpus delicti and Modus operandi, Definition of Physical Evidence, Types of physical evidence, Significance of physical evidences.

Unit IV	**Crime Scene Investigation**	**(9 Hrs)**

Crime scene management and its component, Processing of crime scene: initial survey, assistance to victims, Securing the scene, Documentation of crime scene: Searching methods of evidences at scene of crime, Methods for collection and packaging of evidence, Forwarding the evidence to forensic science laboratories, Maintaining chain of Custody, Role of first responding officer, Duties and responsibilities of crime scene investigator.

Unit V	**Impression and Trace Evidences**	**(8 Hrs)**

Footprint: Introduction, collection, gait pattern and its importance in person identification, Tyre marks: Introduction, types, characteristics, forensic significance, Lip print: Introduction to cheiloscopy, classification, collection and forensic examination, Trace evidences: Paint, soil, glass, fibers and hair.

Unit VI	**Legal Provisions**	**(8 Hrs)**

Fundamental Rights: Right of Equality (Articles 14 to 18) and Right of Freedom (Articles 19 to 22) as per the Constitution of India, Sections of Indian Evidence Act: 32, 45, 46, 47, 57, 58, 60, 65, 65A, 65B, 73, 135, 136, 137, 159, Sections of Criminal Procedure Code: 53, 53A, 54, 291, 292, 293, 311A, Sections of Indian Penal Code: 299, 300, 302, 303, 304, 304B, 306, 319, 320, 326, 339, 340, 351, 359, 362, 375, 377, 378, 383, 390, 405, 415, 441, 463, 471, 499, 503 and 511.

Learning Resources

Reference Books:

1. Henry Lee's Crime Scene Handbook: Henry C Lee.
2. Rao, M.S. and Maithil, B.P. Crime Scene Management: A Forensic Approach 3rd ed. Selective &Scientific Books: India; (2018)
3. Nanda, B.B. and Tiwari, R.K. Forensic Science in India- A Vision for the Twenty First Century. SelectPublisher: New Delhi; (2001)
4. James, S.H. and Nordby, J.J. Forensic Science: An Introduction to Scientific and InvestigativeTechniques. CRC Press: USA; (2003).
5. Saferstein, R. Criminalistics -An Introduction to Forensic Science. Prentice Hall: USA; (1995).
6. Jacquiline T. Fish and Larry S. Miller, Crime Scene Investigation.
7. Bennett W.W. and Hass K.M. Criminal Investigation 6th ed. Wordsworth Thompson Learning: (2001).

8. Barry, A.J. Fisher- Techniques of Crime Scene Investigation, 7th ed. R.C. Press, New York (2003)
9. Sharma, B.R. Forensic Science in Criminal Investigation and Trails. Universal Law Publishing:(2003).
10. Evidence Act, 1872, Bare Act with Case Laws, Forty-eighth Edition, Eastern Book Company, New Delhi.
11. Code of Criminal Procedure, 1973 Bare Act, Thirty-fifth edition, Eastern Book Company, New Delhi.
12. Penal Code, 1860, Bare Act, State amendments and case laws, Forty-fourth edition, Eastern Book Company, New Delhi.
13. Hans Raj Bhardwaj, The Criminal Justice System in India, Konark Publishers Pvt. Ltd., New Delhi
14. Seigel, J.A., Saukko, P.J. and Knupfer, G.C. Encyclopedia of Forensic Science vol. I, II& III. Academic Press: United States; (2000).
15. Gross, H. Criminal Investigation- A Practical Handbook for Magistrates, Police Officers and Lawyers. Forgotten Books: India; (2000).
16. Bell, W.R. Practical Criminal Investigation in Correctional Facilities. CRC Pres: London; (2001).
17. B.S. Nabar, Forensic Science in Crime Investigation, 3rd ed.
18. William Bodziak, Footwear Impression Evidence - Detection, Recovery and Examination, 2nd ed.

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: PCC	**Course Title: Criminology**	
Course Code: **230HFGM03_01**	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 3	**Lecture (L): 2** **Tutorial (T): 1** **Practical (P): 0** **Experiential Learning (EL): 0**	**Theory (TH): 100 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:
After the course the candidate will be able to –

- Candidate will be able understand the nature and scope of criminology as well as explore the foundations of criminal behavior.
- Students will be able to comprehend criminal classifications and analyze criminological theories.
- Students will apply criminological, victimological and penological concepts.
- Students will able to promote ethical awareness, evaluate, and apply the concepts of theoretical foundations.

Course Outcomes: On completion of the course, learner will be able to –

CO1: Identify various types of crimes, such as crimes against persons, property, public morality, and public justice.
CO2: Explain the characteristics and constituents of crime and the classification of different crimes, including conditional, traditional, and modern crimes.
CO3: Categorize criminals into different types, such as violent criminals, property offenders, and occupational criminals, based on their characteristics and motivations.
CO4: Evaluate the significance of criminological theories and schools, including classical, positivist, and modern theories, in explaining criminal behavior.
CO5: Assess the relevance and application of criminology as a science and its growth in the context of other social sciences.
CO6: Develop an overview of victimology, including its history, types, and the role of victimologists in studying and supporting victims of various crimes.

Course Contents

Unit 1	**Foundations of Criminology**	**(7 Hrs)**

Etymology, meaning, and definitions of crime, Characteristics and constituents/elements of crime, Classification of crimes, Types of crimes, including crimes against persons,

property, public morality, and public justice, Conditional crimes, traditional crimes, modern crimes, Crimes based on motives, Special types of crimes: professional crimes, organized crimes, white-collar crimes, cybercrimes, environmental crimes, victimless crimes.		
Unit 2	**Criminals and Criminal Classification**	**(7 Hrs)**
Criminals and their classification, Types of Criminals, Violent Criminals, their Characteristics, motivations, and typologies, Property Offenders, Offenders of Public Morality, Occupational Criminals, Juvenile Offenders, Criminal Profiling, Ethical Issues in Criminal Profiling, Case Studies of Notorious Criminals.		
Unit 3	**Introduction to Criminology**	**(8 Hrs)**
Criminology: Definition, scope, and nature of criminology, Sub-areas of criminology: Comparative Criminology, Victimology, Penology, Historical development of criminology, Criminology as a science, Criminology in the context of other social sciences, Growth of criminology, Criminology in India.		
Unit 4	**Theories of Criminology - I**	**(8 Hrs)**
Definition of criminological theories, and schools, Importance of theories in explaining crime, Demonology: Historical beliefs and superstitions, Classical: Key ideas and thinkers, Critiques and limitations of classical criminology, Neo-Classical School: Developments and modifications to classical theory, Positivist and Positivist School: Key figures and contributions, Transition from free will to determinism, Cartographic School.		
Unit 5	**Theories of Criminology - II**	**(8 Hrs)**
Biological School: Links between biology and criminal behavior, Constitutional School: Study of body types, hereditary traits, and endocrine glands in relation to crime, Economic Theories of Crime, Economic perspectives on criminal behavior, Psycho-Analytical Theories and Psychopathic Personality, Modern and Emerging Theories, Relevance, and application of Criminology.		
Unit 6	**Victimology and Penology**	**(7 Hrs)**
Definition and scope of victimology, History of victimology, Types of victimology, including positivist, radical, and critical perspectives, Role and functions of victimologists, Demographic characteristics of victims, Victims of violent crimes, Typologies of victims, Introduction to the penal system, Theory of punishments, Modes of punishment, Capital punishment.		
Learning Resources		
Reference Books: 1. "Criminology" by Larry J. Siegel 2. “Criminology, Penology & Victimology” - S. S. Srivastava 3. “Principles of Criminology” - E. H. Sutherland 4. "Criminal Behavior: A Psychological Approach" by Curt R. Bartol and Anne M. Bartol 5. "Criminology: Theories, Patterns, and Typologies" by Larry J. Siegel 6. “Forensic Criminology”– Patherick Wayne H. 7. “Criminology” - Harry Elmer Barnes and Negley K. Teeters 8. “Criminology and Penology” - N.V. Paranjape 9. “Criminology and Penology” - J.P.S. Sirohi		

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: MMC	**Course Title: Cyber Security & Privacy**	
Course Code: **230HFGM11_01**	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2	**Lecture (L): 2** **Tutorial (T): 0** **Practical (P): 0** **Experiential Learning (EL): 0**	**Practical (PR): 50 Marks** **Oral (OR): 50 Marks**
Prerequisite Courses, if any: Nil		

Course Objectives:
After the course the candidate will be able to –

- Students will acquire a comprehensive understanding of the fundamentals of cybersecurity and privacy in the digital realm.
- Students will develop expertise in recognizing and analyzing diverse cyber threats.
- The course will equip students with essential knowledge and skills for secure practices with electronic gadgets.
- Students will develop a comprehensive understanding of global and national data protection laws and the promotion of privacy-focused technologies.
- Students will demonstrate an understanding of cybersecurity risk assessment methodologies and incident response strategies.
- Students will gain a comprehensive understanding of the evolving landscape of cybersecurity and privacy

Course Outcomes: On completion of the course, learner will be able to –
CO1: Understanding key terminologies and the historical evolution of cybersecurity and privacy is essential for building a foundation in this field.
CO2: Comprehending the principles of digital forensics and the techniques for acquiring and preserving digital evidence is crucial for effective investigations.
CO3: Identifying and analyzing vulnerabilities through tools like penetration testing and vulnerability assessments is essential for securing against various cyber threats.
CO4: Analyzing case studies of cyberattacks helps uncover the vulnerabilities exploited in different attack categories, including denial-of-service attacks.
CO5: Synthesizing privacy regulations like GDPR and CCPA with privacy-focused tools allows for a comprehensive approach to data protection.
CO6: Evaluating cybersecurity risks, incident response methodologies, and the role of AI in addressing modern security challenges is essential for making informed decisions.

Course Contents		
Unit 1	**Foundations of Cybersecurity and Privacy**	**(5 Hrs)**
Cybersecurity and Privacy: Introduction, Key Terminologies, Importance, Historical, Context and Evolution, Ethical Issues in Digital Privacy, Digital Forensics, Principles of Digital Forensics Investigations, Digital Evidences: Acquisition, Collection, Preservation Techniques, Analysis, Examination Chain of Custody, Legal Considerations.		
Unit 2	**Cyber Threat Landscape**	**(5 Hrs)**
Threats and Vulnerabilities: Understanding Different Categories, Identification & Analysis of Common Vulnerabilities, Malwares (Viruses, Worms, Trojans, Ransomwares), Phishing Attacks, Social Engineering, Dos & DDoS attacks, Case Studies of Notable Cyberattacks, Vulnerability Assessment, Penetration Testing.		
Unit 3	**Security Practices and Technologies**	**(6 Hrs)**
Password Management, Importance of Strong Passwords, and their role in Security, Two-Factor Authentication (2FA), Multi-Factor Authentication (MFA), Access Control, Network Security Concepts, Firewalls and its Management, Intrusion Detection System (IDS), Intrusion Prevention Systems (IPS), Encryption and uses, Security Best Practices for Electronic Gadgets.		
Unit 4	**Data Protection and Compliances**	**(5 Hrs)**
Privacy Regulations, Data Protection Laws, and Regulations, GDPR (General Data Protection Regulation), CCPA (California Consumer Privacy Act), IT Act 2000, Role of Privacy in Cybersecurity, Data Handling and Processing, Privacy-focused Browsers and Search Engines.		
Unit 5	**Risk Management and Incident Response**	**(5 Hrs)**
Understanding Cybersecurity Risks, Cybersecurity Risks (Technical, Human, External), Assessment Methodologies (Qualitative and Quantitative), Incident Response, Methods for Detecting Cybersecurity Incidents, Preparation, Identification, Containment, Eradication, Recovery, Lessons Learned.		
Unit 6	**Future of Cybersecurity and Privacy**	**(4 Hrs)**
Cybersecurity and Privacy in the Digital Age, Role of Artificial Intelligence (AI) and Machine Learning in Cybersecurity, Privacy challenges in the era of IoT (Internet of Things), Bring Your Own Device (BYOD), Blockchain and its Potential, Career Opportunities in Cybersecurity, Industry Standard Certifications (e.g., CISSP, CISM, CEH, etc.).		

Learning Resources

Reference Books:

1. "Cybersecurity and Cyberwar: What Everyone Needs to Know" by P.W. Singer and Allan Friedman
2. "Network Security Essentials: Applications and Standards" by William Stallings
3. "Cybersecurity and Privacy: An Introduction" by Dheeraj Sanghi
4. "Computer Forensics and Cyber Crime: An Introduction" by Marjie T. Britz

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: SEC	**Course Title: Body Language and Lie Detection**	
Course Code: **230HFGM12_01**	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 3	**Lecture (L): 2** **Tutorial (T): 0** **Practical (P): 2** **Experiential Learning (EL): 0**	**Practical (PR): 50 Marks** **Oral (OR): 50 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- To make students familiarize about the importance of body language in communication, and how you can use it to your advantage.
- To develop understanding about the human mind and to detect lying and deception.
- To acquaint students about how to read body language to understand a person's true emotions.
- The link between the mind and body, and how this reflects a person's motives.
- To establish a strong understanding about modern instruments and techniques of lie detection

Course Outcomes: Students completing the course will be able to:

CO1: Understand the range of nonverbal behaviors that comprise 'body language'

CO2: Understand how personal style influences your body language.

CO3: Interpret common gestures.

CO4: Know how to read facial expressions.

CO5: Get better understanding about techniques used in deception detections and advance methods

Course Contents

Unit I	Introduction to Body Language	(7 Hrs)

Understanding Non-Verbal Communication, Definition of body language, Importance of non-verbal communication, Historical and cultural aspects of body language, Types of Body Language-Facial expressions, Gestures and postures, Eye contact and gaze, Proxemics (personal space), Microexpressions, Recognizing microexpressions, Emotions and their manifestations, Interpreting Body Language.

Unit II	Personal Communication and Monitoring	(7 Hrs)

The impact of body language on personal relationships, Improving self-presentation, Professional Communication, Non-Verbal Leadership, Building trust and authority through non-verbal cues. Mirroring and rapport building, Body Language in Conflict Resolution, Identifying signs of conflict through body language, De-escalation techniques, Ethical Considerations.

Unit III	**Detecting Deception**	**(6 Hrs)**

Signs of lying and dishonesty, Differences between truthful and deceptive body language, Attraction and Relationships, Flirting and courtship signals, Cross-cultural differences in romantic body language, Gender and Cultural Differences, Cultural variations and norms.

Unit IV	**Lie Detection Methods and Legal Aspects**	**(7 Hrs)**

Effective questioning strategies-Building rapport with subjects, Ethical considerations in interrogation, Interviewing vs. interrogation, Polygraph technology, Eye-tracking and gaze analysis, Voice stress analysis, Neuroimaging in deception detection, Case studies in Lie detection, Legal guidelines for lie detection, Privacy and human rights considerations, Ethical challenges in detecting deception.

Unit V	**Practical – Part 1**	**(8 Hrs)**

Observing Body Language, Study of Proxemics, Implementing Rapport Building Tactics, To study Cultural Difference Aspect in Body Language.

Unit VI	**Practical – Part 2**	**(10 Hrs)**

To implement Science of Deception Detection, Mock Lie Detection Setup Study for Pretest, Chart Collection and Post-Test, Formation of Relevant, Irrelevant and Control Questions, To study Voice stress.

Learning Resources

Reference Books:

1. “What Every BODY is Saying: An Ex-FBI Agent’s Guide to Speed-Reading People” by avarro, Joe and Karlins, Marvin.
2. “Human Lie Detection and Body Language” by Vanessa van Edward
3. “Body Language: How To Be A Human Lie Detector” by Scott Rouse
4. “The Dictionary of Body Language” by Joe Navarro
5. “Detecting Lies and Deceit: Pitfalls and Opportunities” by Aldert Vrij
6. “The Ultimate Guide To Lie Detection” by Michael J. Hanks
7. “The Polygraph and Lie Detection” by National Research Council

MOOC / NPTEL Courses:

1. “Body language: Key to professional Success” By Prof. Rashmi Gaur Link - https://onlinecourses.nptel.ac.in/noc20_hs71/preview

JSPM University Pune F.Y. M. Sc. Forensic Science Semester I		
Course Type: VSC	**Course Title: Design Thinking and Creativity**	
Course Code: **230IDCB01_01**	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 1.5	**Lecture (L): 1** **Tutorial (T): 0** **Practical (P): 0** **Experiential Learning (EL): 2**	**Oral (OR): 50 Marks**
Prerequisite Courses, if any:		
Course Objectives:		
Course Outcomes: On completion of the course, learner will be able to, **CO1:** Describe the Design thinking principles of Human Centered approach to real life problem solving **CO2:** Demonstrate through the project-oriented approach the basic theories and knowledge of design thinking and master the tools and principles of design thinking, and their application. **CO3:** Demonstrate through the project-oriented approach the basic theories and knowledge of design thinking and master the tools and principles of design thinking, and their application. **CO4:** Analysis of various applications of design thinking. **CO5:** Determine the suitable design thinking approach to solve the problem. **CO6:** Develop a low fidelity prototype of the alternative Solutions to the identified Problem.		
Course Contents		
Unit I	**Design Thinking Introduction**	**(3 Hrs)**
Introduction & definition of design thinking, Principles, the process, Innovation in design thinking, importance of design thinking method, the relationship between design thinking and innovation & entrepreneurship. Five step method of Design thinking (Empathize, Define, Ideate, Prototype, Test), Class Activity: Students are asked to form groups. Classroom Project begins: Share ideas with team members, discuss about meaning of DT, it's importance in today's world, Case: ABC Nightline- IDEO Shopping Cart, (the video can be shown in classroom for discussion.)		
Unit II	**Awareness of the five stages of design thinking, Empathize & Define**	**(5 Hrs)**

Introduction of the tools in the stage of empathy. Emphasize the skills and tactics of interviews. Understand the persona, Methods of collecting the data from interviews. The empathy map, Establishing the Problem statement using 5 Why's technique as a tool to understand the root cause. (Ex.26/11 attack, rescue team not able to move with ambulance due to stagnation) & Emphasis on establishing the "Problem Statement" only for faculty ref. Classroom Project: Each group will write the Problem Statement by using Stages of Empathy and technique of 5 Why's. Each group member will do the interview round for writing the problem statement. Take record of the interview process.		
Unit III	**Ideate**	**(10 Hrs)**
Process to Find and select ideas, The creative process and creative principles, Creativity techniques, Evaluation of ideas. Idea Generation Stage-Fine tuning process of ideas (every team member comes up with 1 idea and passes on to next person, each idea will be fine-tuned by each team member and ultimately matured ideas are established- round robin method) and selection of best three ideas by voting method. Classroom Project: Through the project, students will know how to propose the point of view (POV) statement based on the analyses of data from user research via the brainstorm and others. Students are asked to submit ideas as many as possible. Note in POV practice: please define the problem which each group is finally going to resolve. The practice process: unpack the interview data, select one interviewee as analysis target and solution. Make inferences to generate ideas and POV statement. Please remember: No solution in the POV statement. (For faculty ref.: YouTube links for DT examples -How design thinking is transforming lives in rural India - https://www.youtube.com/watch?v=EH9u1bHqwpc Design Thinking in Netflix | | Case Studio - 04 - https://www.youtube.com/watch?v=8P8gspd_Bx8)		
Unit IV	**Prototype & Test**	**(5 Hrs)**
Prototype and test stage, Prototype model, The role of prototype and test in the innovation and entrepreneurship. prototype and the way to test, visualization of ideas. Classroom project: groups design the prototype to show ideas about the innovative way to resolve the problem in the dormitory life. Concerning the test practice: Ask other group to visit your group and test your prototype, and then in turn.		
Unit V	**Understanding Business Viability**	**(2 Hrs)**
Checking the Business viability of selected ideas derived in stage 3 using BXT model, Tools for the Design Journey, Pillars of Design thinking.		
Unit VI	**Presentation and closure**	**(3 Hrs)**
The student groups will give the final presentation of the project they have done (Unit 1 to 5) and close the DT process.		
Learning Resources		
Text Books: 1. Design Thinking Methodology Book Paperback, ArtBizTech, Emrah Yayici, 2016. 2. Design Thinking for Strategic Innovation, by Idris Mootee, CEO Idea Couture, Wiley 2014		
Reference Books: 1. "SL Schensul, JJ Schensul, MD LeCompte", (latest reprint) Essential Ethnographic Methods: Observations, Interviews, and Questionnaires: (Ethnographer's Toolkit), https://rowman.com/ISBN/9780759122017 2. Paddy Miller, Thomas Wedell-Wedellsborg, (2013), Innovation as Usual: How to Help		

Your People Bring Great Ideas to Life, HBR Press
3. Tim Brown, (2010), Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, HBR Press
4. “SL Schensul, JJ Schensul, MD LeCompte”, (latest reprint) Essential Ethnographic Methods: Observations, Interviews, and Questionnaires: 2 (Ethnographer's Toolkit), https://rowman.com/ISBN/9780759122017

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: AEC	**Course Title: Communicative English for Professionals**	
Course Code: 230UENM01_01	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2	**Lecture (L): 1** **Tutorial (T): 0** **Practical (P): 2** **Experiential Learning (EL): 0**	**Theory (TH): 50 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- **Remember** the different aspects of communication.
- **Understand** basics of grammar, sentence construction and vocabulary to write and speak effectively.
- **Apply** appropriate modes of expressions in written and oral communication.
- **Analyze** the attitude and aptitude of the speaker in the professional sphere for effective listening skill.
- **Evaluate** the non-verbal clues of the speaker for effective communication.
- **Cultivate** students to create commendable personalities.

Course Outcomes: On completion of the course, learner will be able to

CO1: Understand and practice different types of communication.

CO2: Reflect on basic language skills-listening, speaking, reading, and writing and attempt tasks by using functional grammar and vocabulary effectively.

CO3: Reproduce their understanding of concepts/principles of business communication skills.

CO4: Build relationships, solve problems, ensure understanding, resolve conflicts, and improve accuracy.

CO5: Become more self-confident and develop a strong determination.

CO6: Build social skills with ease and comfort.

Course Contents

Unit I	**Foundation of Communication**	**(3 Hrs)**

Importance and types of Communication, Types of communication: Verbal and Non-verbal, Channels of communication, Barriers to Effective Communication and ways to mitigate.		
Unit II	**Language Competency/Functional English**	**(3 Hrs)**
Basic rules of Phonics, Parts of Speech, Sentence Constructions, Prefixes and Suffixes		
Unit III	**Business Communication at Workplace**	**(2 Hrs)**
Types of business letter, Characteristics of good business letter, Letter Components and Layouts, Email Communication, memo		
Unit IV	**Mindful Listening**	**(2 Hrs)**
The purpose and types of listening, Principles of effective listening, Ways to improve listening skills, Role of Active listening in professional interactions and conflict resolutions		
Unit V	**Art of Effective Verbal Interaction**	**(2 Hrs)**
Identifying common fears and anxieties related to speaking, Techniques to build confidence and overcome stage fright, Voice modulation, pitch, and pace for engaging delivery, Impromptu Speaking		
Unit VI	**Effective Body Language**	**(3 Hrs)**
Basic Principles of Body Language and Nonverbal Communication, Signs and Clusters, Kinesics & Proxemics, Gesture & Posture		
Learning Resources		
Textbook: 1. Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.		
Reference Book: 1. Carnegie, Dale. The Quick and Easy Way to Effective Speaking. New York: Pocket Books, 1977. 2. Mitra, Barun. Personality Development & Soft Skills, New Delhi: Oxford Press, 2011		
MOOC / NPTEL Course: NPTEL Course “Developing Soft Skills and Personality” by Prof. T Ravichandran, IIT Kharagpur **Link of the Course:** https://nptel.ac.in/courses/109104107 **Additional Web Resources:** https://www.britishcouncil.in/english/online/resources-websites/moocshttps://www.dailywritingtips.com/		

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: AEC	**Lab Course Title: Communicative English for Professionals**	
Course Code: 230UENM01_01	**Teaching Scheme:**	**Examination Scheme:**
Credits: 2	**Lecture (L): 1** **Tutorial (T): 0** **Practical (P): 2** **Experiential Learning (EL): 0**	**Theory (TH): 50 Marks**
Prerequisite Courses, if any: - Nil		

List of Laboratory Experiments	
Group A	
1.	Phonics
2.	Parts of Speech
3.	Presentation Skills
4.	Tenses
5.	Verbal and Non-verbal Communication
Group B	
6.	Listening Skills
7.	Reading Skill
8.	Body Language
9.	Formal Writing
10.	Email Writing
Virtual LAB Links:	

JSPM University Pune

F.Y. M.Sc. Forensic Science

Semester I

Course Type: RMC	**Course Title: Research Methodology**	
Course Code: 230IRMM01_01	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2	**Lecture (L): 2** **Tutorial (T): 0** **Practical (P): 0** **Experiential Learning (EL): 0**	**Theory (TH): 50 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

1. To familiarize students with Business Research Activities.
2. To improve students' ability to carry out research in business and social sciences.
3. To help students figure out the best way to conduct their research.
4. To familiarize students with the practice of applying various research methods and techniques.

Course Outcomes: On completion of the course, the learner will be able to –

CO1: Define several terms and concepts related to scientific and business research.

CO2: Describe the concepts and terminologies used in business and scientific research in their entirety.

CO3: Apply scientific research principles to solve modern business problems.

CO4: Analyse a research problem from multiple angles and highlight pertinent facets of the research process.

CO5: Assess each design's suitability for research, sampling, data collection, and data analysis options in relation to a specific, real-world business research problem.

CO6: Address practical business research problems, develop research and sampling designs, data collection tools, testable hypotheses, and data analysis techniques, and write research reports, proposals, and papers.

Course Contents

Unit I	**Introduction to Research**	**(5 Hrs)**

Meaning and Definition of Research, Objectives of Research, Characteristics of Research, Need for Research, Importance of Research, Types of Research

Unit II	**Problem Identification and Formulation**	**(5 Hrs)**

Research Process, Basic Overview, Defining the Research Problem, Formulation of Research Problem / Errors in Selecting Research Problem, Research Questions (Management, Investigation), Research Methods vs. Research Methodology

Unit III	Literature Review and Hypothesis	(5 Hrs)
Literature Review Concepts and Theories, Meaning of Hypothesis and Formulation of Hypothesis Sources of Hypothesis, Characteristics of Hypothesis, Role of Hypothesis, Tests of Hypothesis		
Unit IV	**Research Data**	**(5 Hrs)**
Sampling Design and Types and Techniques, Types of Data, Methods of Data Collection, Questionnaires, Observation Method and Interview Method, Case Study Method		
Unit V	**Ethics in Research**	**(7 Hrs)**
Ethics in Conduct of Research, Ethical Challenges in Data Collection, Ethical issues in scientific Publication, Plagiarism and Self-Plagiarism, Cases of Scientific Misconduct		
Unit VI	**Scientific Writing**	**(7 Hrs)**
Preparation of Title, Keywords, and Methods Section, Preparation of Figures and Schematics, Citations and Referencing, Report Writing and Presentation, Layout of a Research Paper, Research Journals, Impact Factor of Journals		

Learning Resources

Text Books:

1. P. L. Bhandarkar, T. S. Wilkison & D. K. Laldas, "Methodology & Techniques of Social Research", Himalaya Publishing House
2. Dipak Kumar Bhattacharyya, "Research Methodology", Excel Books

Reference Books:

1. C. R. Kothari, *"Research Methodology-Methods & Techniques"*, New Age International Publishers
2. Pervez Ghauri, Dr. Kjell Gronhaug, *"Research Methods in Business Studies: A Practical Guide"*, FT Prentice Hall
3. Allen, Earl R. Babbie, *"Research Methods for Social Work"*, Cengage
4. Royce Singleton, Bruce C. Straits, Margaret Miller Straits, *"Approaches to Social Research"*, Oxford University Press
5. Alan Bryman & Emma Bell, *"Business Research Methods"*, Oxford University Press
6. Donald Cooper & Pamela Schindler, *"Business Research Methods"*, TMGH.

MOOC / NPTEL Courses:

1. SWAYAM Course *"MCO-03: Research Methodology and Statistical Analysis"*, Prof (Dr) Subodh Kesharwani, Name of the conducting Institute: Indira Gandhi National Open University, **Link of the Course:** https://onlinecourses.swayam2.ac.in/nou23_cm17/preview
2. SWAYAM Course "Research Ethics using Research Methodology: Creating a New Global Education Curriculum", Satya Saurabh Khosla **Link of the Course:** https://onlinecourses.swayam2.ac.in/aic21_ge02/preview

Additional Web Resources:

1. https://www.iedunote.com/research-methods
2. https://ccsuniversity.ac.in/bridge-library/pdf/Research-Methodology-CR-Kothari.pdf
3. https://www.researchgate.net/publication/363032252_Research_Methodology_Notes
4. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBAX1023.pdf
5. https://microbenotes.com/category/research-methodology/

6. https://southcampus.uok.edu.in/files/link/downloadlink/rm%20u1%20p1.pdf
7. https://www.studocu.com/in/document/bharati-vidyapeeth-university/research-methodology/research-method-notes/31514135

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: LC	**Course Title: General Forensic Science and Crime Scene Investigation Lab**	
Course Code: 230HFGM15_01	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 1	**Lecture (L): 0** **Tutorial (T): 0** **Practical (P): 2** **Experiential Learning (EL): 0**	**Practical (PR): 50 Marks**

Prerequisite Courses, if any: Nil

List of Laboratory Experiments (Minimum 10)	
Group A	
1.	To protect a given crime scene.
2.	To perform crime scene photography.
3.	To perform videography of a crime scene.
4.	To perform crime scene sketching.
5.	To collect various evidences from the scene of the crime.
Group B	
6.	Packaging and forwarding of physical evidences.
7.	To examine hair samples through a microscope.
8.	Examination of fibers through a microscope.
9.	To compare and calculate diameter of given bangle piece.
10.	To compare cloth samples by physical matching.
Group C	
11.	To study and classify lip prints.
12.	Examination of soil through a microscope.
13.	To study footprints on various surfaces.
14.	To study characteristics of various tyres.
15.	Classify various blood spatter patterns.

JSPM University Pune F.Y. M.Sc. Forensic Science Semester I		
Course Type: LC	**Course Title: Advanced Instrumental Methods Lab**	
Course Code: 230HFGM16_01	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 1	**Lecture (L): 0** **Tutorial (T): 0** **Practical (P): 2** **Experiential Learning (EL): 0**	**Practical (PR): 50 Marks**

Prerequisite Courses: NIL

List of Laboratory Experiments (Minimum 10)	
Group A	
1.	Perform analysis using paper chromatography
2.	Preparation of TLC Plate.
3.	Analysis of Petroleum Products using TLC.
4.	Separation of drugs/ink by TLC and measurement of Rf value.
5.	Color Spot Test/ TLC of Common Drugs of Abuse.
Group B	
6.	Chemical and UV-Vis Analysis of Cannabis Products.
7.	Experimental working of Compound Microscope.
8.	Experimental working of Stereo Microscope
9.	Experimental working of Polarizing microscope
10.	Experimental working of Optical Projection Microscope
Group C	
11.	Experimental working of Comparison Microscope
12.	Examination of chemicals/drugs using FT-IR spectrophotometer.
13.	Examination of chemicals/drugs using Gas Chromatography.
14.	Examination of chemicals/drugs using HPLC.
15.	Examination of chemicals/drugs using HPTLC.

JSPM University Pune F.Y. M.Sc. Forensic Science Semester II		
Course Type: PCC	**Course Title: Forensic Chemistry, Toxicology and Medicine**	
Course Code: 230HFGM04_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2	**Lecture (L): 2** **Tutorial (T): 0** **Practical (P): 0** **Experiential Learning (EL): 0**	**Theory (TH): 100 Marks**

Prerequisite Courses, if any:

1. NIL

Course Objectives:

1. The students will able to understand the various types of drugs, commonly abused along with their presumptive & instrumental analysis.
2. They will know the legal provisions & Forensic investigation regarding drugs, cosmetics, fire and arson evidences.
3. The students shall also learn regarding various types of poison, their nature, action sign & symptoms with standard procedure of examination in poisoning cases.
4. They will also get to know medico legal aspect of poisons and the management of toxicological cases.
5. To get acquainted with the postmortem findings of the cadaver and the rules of performing medical autopsy.

Course Outcomes: On completion of the course, learner will be able to –

CO1: Analysis of food adulteration samples as well as alcoholic beverages
They would also know types of beverages and their forensic analysis and also forensic investigation of fire and arson scene evidences.
CO2: The basic concept of toxicological examination, types of poison, drugs of abuse,
CO3: Collection, preservation, extraction and analysis of biological and non-biological samples in a toxicological analysis.
CO4: Understand the mechanism of drug in human body.
CO5: Comprehend various methods for analysis of poisons and drugs
CO6: Understand the Forensic Medicine and Medical Jurisprudence with their legal aspects.
CO7: Explain the mode and manner of death as well as identify early and late changes of the death.
CO8: Understand the rules of performing the medical autopsy.

CO9: Determine the postmortem findings of the cadaver and classify the types of injuries and wounds.		
Course Contents		
Unit I	**Forensic Chemistry - I**	**(5 Hrs)**
Introduction, Definition, Scope & Significance, Role of Forensic Chemist. Types of cases/exhibits, preliminary screening, presumptive test (color and spot test), micro-chemical methods of analysis, examination procedures involving standard methods and instrumental techniques. Analytical techniques for analysis of exhibits involved in food adulteration. Introduction of Beverages, Classification of Beverages (alcoholic and non-alcoholic beverages, their composition) Country Made and Illicit Liquors and their Forensic Analysis.		
Unit II	**Forensic Chemistry - II**	**(5 Hrs)**
Introduction, Definition, Classification of Petroleum Products. Examination of Petroleum Products: distillation and fractionation, various fractions and their commercial uses, standard methods of analysis of petroleum products in Forensic Exhibits. Introduction and Definition of Arson, Chemistry of fire, Origin and Cause of Fire, Types of Ignitable Liquids, Forensic Investigation of Fire and Arson Scenes, evaluation of clue material, analysis of Fire and Arson exhibits by Instrumental Methods.		
Unit III	**Forensic Toxicology - I**	**(5 Hrs)**
Introduction and concepts of forensic toxicological examination, Definition and classification of poison, methods of administration of poison, Mode of action of the poison, diagnosis, and management of poisoning cases, Classification of drug of abuse: depressant, stimulant, and hallucinogen; Depressants: opium and opioids, barbiturates, and benzodiazepines; Stimulants: cocaine, nicotine, and amphetamines; Hallucinogens: cannabis and its derivatives, phencyclidine, and LSD		
Unit IV	**Forensic Toxicology - II**	**(5 Hrs)**
Poisons: General classification of poisons, classification on the basis of occurrence, natural availability, chemical nature, mode of action. Plant, Animal Poison, Metallic Poison, Types of poisoning, collection, and preservation of toxicological exhibits in fatal and survival cases, signs and symptoms of poisoning, mode of action and its effect on vital functions, Medico-legal and post mortem examination report/finding studies, specific analysis plan/ approach to toxicological examination of poisoning samples, excretion of poisons, detection of poisons on the basis of their metabolic studies, Interpretation of analytical data and forming of opinion.		
Unit V	**Forensic Medicine - I**	**(5 Hrs)**
Introduction and scope of forensic medicine, historical perspectives of forensic medicine: global and Indian scenario, Legal aspects in view of forensic medicine: Inquest, exhumation, dying declaration, dying deposition, medical certificates, medical report, postmortem reports. Death: definition and types, modes of death, stages of death-somatic death and molecular death, signs of death, changes after death: early changes- Algor mortis, rigor mortis, cadaveric spasm, heat stiffening, cold stiffening, changes in blood, chemical changes in		

cerebrospinal fluid, changes in vitreous humor, post mortem lividity, fluidity of blood, late changes- putrefaction- external and internal changes, adipocere, mummification, destruction of body and tissues by maggots and other insects. Medico legal aspects of death. Violent asphyxial deaths: Hanging, strangulation, suffocation and drowning.

Unit VI	**Forensic Medicine - II**	**(5 Hrs)**

Medical Autopsy: Introduction and objectives, rules for medico legal autopsy, external and internal examination of body, collection and preservation of postmortem samples, autopsy report. Injury: Introduction and classification of injury; medico legal aspects of injuries; mechanical injuries -Abrasions, Bruises, Lacerations, Incised wounds, stab wounds, defense wound and self-inflicted wounds, Regional injuries- Head injury, injuries to brain, abdomen and other body parts; accident injuries: vehicular injuries, railway injuries and aircraft injuries; injury due to fall. Thermal injuries: Burn and scalds, Lightning, Electricity and Explosions. Infanticide: Introduction, definition and types.

Learning Resources

Reference Books:

1. Douglas A. Skoog, F. James Holler, Stanley R. Crouch, Principles of Instrumental Analysis, Cengage Learning
2. Hobart H. Willard, Lynne Lionel Merritt, John Aurie Dean, Frank A. Settle, Instrumental Methods of Analysis, CBS Publishers.
3. Suzanne Bell and Keith Morris, An Introduction to Microscopy, CRC Press
4. Abhilasha Shourie, Bioanalytical Techniques, The Energy and Resources Institute
5. Kemp, W. Organic Spectroscopy 3rd ed.PALGRAVE: New York; (1991).
6. Willdard, H.H., Merritt, L.L. and Dean, J.A. Instrumental Methods of Analysis 5th ed. Van Nostrand:New York; (1974).
7. Settle,F.A. Handbook of Instrumental Techniques for Analytical Chemistry. Prentice Hall: (1997).
8. Stahl, E. Thin Layer Chromatography: A Laboratory Handbook. Springer: Berlin; (1969).
9. Jickells, S. and Negrusz, A. Clarke's Analytical Forensic Toxicology. Pharmaceutical Press: (2008).
10. Houck, M.M. Fundamentals of Forensic Science. Academic Press: (2015).
11. Skoog, D.A., West, D.M. and Holler, F.J. Fundamentals of Analytical Chemistry 6th ed. SaundersCollege Publishing: (1996).
12. Robinson, J.W. Undergraduate Instrumental Analysis. Marcel Dekker: New York; (1987).
13. Chatwal, G.R. and Anand, S.K. Instrumental Methods of Chemical Analysis 5th ed. Himalaya Publishing: Bombay;(2019)
14. Mozayani, A. and Noziglia, C. Forensic Laboratory Handbook Procedure and Practice. Humana Totowa:New Jersey; (2011).
15. DFS Manual, 2005
16. Teotia, A.K. and Pal, R. Practical Aspects of Forensic Chemistry. Selective & Scientific Books: NewDelhi; (2013).

JSPM University Pune F.Y. M.Sc. Forensic Science Semester II		
Course Type: PCC	**Course Title: Forensic Biology and Serology**	
Course Code: 230HFGM05_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2.5	**Lecture (L): 2 Tutorial (T): 0 Practical (P): 0 Experiential Learning (EL): 2**	**Theory (TH): 100 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- To learn about different body fluids, their detection and forensic significance.
- To learn about the differences between human and animal hair.
- To learn about the forensic microbiology and Microbial forensics.
- Understand different domain under Forensic Biology**.**
- Importance of forensic anthropology in identification of persons.
- Different techniques of facial reconstruction and their forensic importance.
- Significance of somatoscopy and somatometry.
- To understand different serological techniques.

Course Outcomes: On Completion of this course, Students will be able to

CO1: To understand different biological evidences

CO2: To understand basics of Wildlife Forensics, Forensic Anthropology, Odontology and Forensic Entomology

C03: Distinguish between hair samples from different sources and also understand the significance of biological evidences.

CO4: Understand basics of Immunology, Identify and analyses different body fluids found in a crime scene.

CO5: Demonstrate the significance of microbes in forensic sciences, and overview of immunology.

CO6: Apply the knowledge of anthropology in investigations pertaining to identification of persons.

CO7: Have knowledge of facial reconstruction and its application.

CO8: Have knowledge of Serological techniques

Course Contents		
Unit I	**Biological Evidence**	**(6 Hrs)**

Nature and importance of biological evidence, Significance of hair evidence. Transfer, persistence and recovery of hair evidence. Structure of human hair. Comparison of hair samples, Morphology and Biochemistry of human hair. Comparison of human and animal hair, Diatoms and their forensic significance. Palynology and limnology.

Unit II	Microbiology, Wildlife Forensics and Forensic Entomology	(7 Hrs)

Microbiology: Introduction, Types of microbes, Microbial organisms of forensic significance. Role Microbial DNA in Crime Scene Investigation, Biological warfare Agents, Microbial Bioterrorism. Wildlife Forensic: Fundamentals of wildlife forensic. Significance of wildlife forensic. Protected and endangered species of animals and plants. Illegal trading in wildlife items (skin, fur, bone, horn, teeth, flowers and plants). Pug mark Identification. Entomology: Basics of forensic entomology. Insects of forensic importance. Collection of entomological evidence during death investigations.

Unit III	Forensic Anthropology and Odontology	(6 Hrs)

Forensic Anthropology: Scope, Importance. Study of human skeleton. Nature, formation, and identification of human bones. Determination of age, sex, stature from skeletal material. Somatoscopy, Somatometry Indices - cephalic index, nasal index, cranial index. Portrait Parle/ Bertillon system. Facial superimposition techniques. Human dentition: Dental numbering system. History of dental identification, ABFO guidelines and standards. Bite mark impressions and its forensic significance.

Unit IV	Introduction to Serology	(6 Hrs)

Overview of basic Immunology, Cellular antigens, Antibodies. Introduction to body fluids (Blood, saliva, sweat, semen, vaginal fluid, vomit, vitreous humor, colostrum, etc.). Blood and its components, Types of blood groups. Collection and preservation of body fluids.

Unit V	Forensic Examination of Body fluids	(6 Hrs)

Determination of blood groups. Antigens and antibodies. Forensic characterization of bloodstains. Typing of dried stains. Morphology of spermatozoa. Presumptive and Confirmatory tests for identification of semen, saliva, sweat, urine, vaginal secretions, faecal matter. Forensic significance of body fluids.

Unit VI	Serological Techniques	(6 Hrs)

Serological techniques-primary binding assay: enzyme linked immunosorbent assay (ELISA), Immuno-chromatographic assays. Secondary binding assays, Precipitation based assays: immunodiffusion, electrophoretic methods, Agglutination based assays: direct agglutination assay, passive agglutination assay, agglutination inhibition assays.

Learning Resources

Reference Books:

1. G.T. Duncan and M.I. Tracey in Introduction to Forensic Sciences, 2nd Edition, W.G. Eckert (Ed.), CRC Press, Boca Raton (1997).
2. S. Chowdhuri, Forensic Biology, BPRD, New Delhi (1971).
3. Forensic Biology, Richard Li, 2nd edition
4. R. Saferstein, Criminalistics, 8th Edition, Prentice Hall, New Jersey (2004).

5. Barris, H. and Hopkinson, D.A. (1976): Handbook of Enzyme, Electrophoresis Elsevier, North, Holland, New York.
6. Robertson (1999) : Forensic examination of Hair. Francis & Taylor, USA.
7. Gilblet, E. (1969) : Markers in Human Blood, Davis, Pensylvania
8. Culliford, B.E. (1971) The Examination and Typing of Blood Stains, US Deptt. of Justice, Washingron
9. Dunsford, I and Bowley, C. (1967) : Blood Grouping Techniques, Oliver & Boyd, London
10. Boorman KE, Dodd BE, Lincoln PJ. (1988) Blood group serology, 6th ed. Edinburgh : Churchill Livingstone.
11. Basin Et al. A laboratory Manual for Human Blood analysis. Kamla Raj Enterprises.

MOOC Course:
Modules:
Link: https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_pg/699

JSPM University Pune

F.Y. M.Sc. Forensic Science

Semester II

Course Type: PSBC	**Course Title: Intellectual Property Rights**	
Course Code: 230HFGM06_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 3	**Lecture (L): 3** **Tutorial (T): 0** **Practical (P): 0** **Experiential Learning (EL): 0**	**Theory (TH): 100 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- Understand the diverse spectrum of Intellectual Property Rights (IPR) and their legal frameworks.
- Evaluate India's National IP Policy and government schemes supporting IPR.
- Apply legal knowledge to address IPR issues in digital environments and commerce.
- Analyze case studies to comprehend real-world IPR scenarios and protection strategies.
- Explore emerging trends in digital IPR, including open-source software and AI challenges.
- Identify and assess career opportunities in various sectors related to Intellectual Property.

Course Outcomes:

CO1: Recall and differentiate between various types of Intellectual Property Rights (IPR) and their legal frameworks.
CO2: Interpret India's National IP Policy, government schemes supporting IPR, and legal provisions related to technology and intellectual property.
CO3: Apply legal knowledge from the Indian Information Technology Act to analyze and address intellectual property issues in digital environments.
CO4: Analyze case studies related to IPR, assessing infringement cases, legal disputes, and successful protection strategies.
CO5: Evaluate emerging trends in Intellectual Property in the digital age, including open-source software, Creative Commons, and their impact on IPR enforcement.
CO6: Develop an understanding of career opportunities in Intellectual Property, identifying roles, responsibilities, and skill sets required in the field.

Course Contents

Unit I	**Introduction to IPR**	**(7 Hrs)**

Intellectual Property Rights – Introduction, Types - Copyright, Patent, Trademark, Trade Secret and Trade Dress, Design and Layout Design, Geographical Indication, Plant Varieties, Traditional Knowledge, Significance of IPR, International treaties and agreements related to IPR		
Unit II	**Copyrights**	**(7 Hrs)**
Copyright - its Nature and Scope, Copyrightable Subject Matter, Rights of Copyright Owners and Limitations, Piracy, Fair Use and Exceptions in Copyright Law, Digital Rights Management, and Online Copyright Issues.		
Unit III	**Patent**	**(8 Hrs)**
Fundamentals of Patents: Definition and Purpose, Patentable Subject Matter and Requirements, Patent Application Process, Patentee, Patent Infringement and Defenses, International Patent Systems and Challenges.		
Unit IV	**Trademarks**	**(8 Hrs)**
Trademarks: Nature, Functions, Trademark Registration and Enforcement, Trademark Infringement and Dilution, Trade Dress and Non-Traditional Trademarks, Global Trademark Issues, Trade Secrets, Trade Secret vs. Patents and Copyrights		
Unit V	**Other IPRs**	**(7 Hrs)**
Design and Layout Design: Overview of Designs and infringement, Geographical Indication: Significance, and Protection of Regional Products, Plant Varieties: Plant Breeders' Rights, Protection, and Challenges, Traditional Knowledge: Protection of Indigenous Knowledge and Challenges in IP Law.		
Unit VI	**Emerging Issues in IPR**	**(7 Hrs)**
Intellectual Property Rights (IPR) in India, Introduction to National IP Policy, 2016, Legal provisions related to IPR, E-Governance & E-Commerce, Open-source software and Creative Commons, Artificial Intelligence and Challenges in Intellectual Property Rights (IPR) Enforcement		

Learning Resources

Reference Books:

1. D.P. Mittal (Taxman Publication), Indian Patents Law and Procedure
2. Law relating to Intellectual Property, Universal Law Publishing Co, by Dr. B. L. Wadera
3. B.L. Wadera, Patents, trademarks, copyright, Designs and Geographical Judications.
4. P. Narayanan (Eastern Law House), Intellectual Property Law
5. N.S. Gopalakrishnan & T.G. Agitha, Principles of Intellectual Property (2009), Eastern Book Company, Lucknow
6. Law of Intellectual Property, Asian Law House, Dr.S.R. Myneni.
7. Intellectual Property Rights and the Law, Gogia Law Agency, by Dr. G.B. Reddy
8. Ahuja, V K. (2017). Law relating to Intellectual Property Rights. India, IN: Lexis Nexis.

MOOC Course:

1. UGC MOOCS: https://ugcmoocs.inflibnet.ac.in/index.php/courses/view_ug/370
2. SWAYAM: https://onlinecourses.nptel.ac.in/noc22_hs59/preview

Modules:

Link:

1. Subramanian, N., & Sundararaman, M. (2018). Intellectual Property Rights – An Overview. Retrieved from http://www.bdu.ac.in/cells/ipr/docs/ipr-eng-ebook.pdf

2. World Intellectual Property Organisation. (2004). WIPO Intellectual property Handbook. Retrieved from https://www.wipo.int/edocs/pubdocs/en/intproperty/489/wipo_pub_489.pdf .

JSPM University Pune

F.Y. M.Sc. Forensic Science

Semester II

Course Type: MMC	**Course Title: C and C++ Programming Languages**	
Course Code: 230HFSB10_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2	**Lecture (L): 2** **Tutorial (T): 0** **Practical (P): 0** **Experiential Learning (EL): 0**	**Practical (PR): 50 Marks** **Oral (OR): 50 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- Gain a solid understanding of fundamental programming concepts in C, including variables, control structures, and functions.
- Comprehensively cover C++ features such as classes, objects, inheritance, and polymorphism.
- Cultivate problem-solving skills by engaging in hands-on coding exercises, projects, and case studies.
- Acquire the skills to write modular and efficient C programs for data processing.

Course Outcomes:

CO1: Students will recall and identify fundamental concepts in C and C++ programming, including data types, variables, control structures, and basic syntax.

CO2: Students will demonstrate an understanding of modular programming by explaining how functions work, how they are declared and defined, and the concept of scope and lifetime of variables.

CO3: Students will apply their knowledge of arrays, strings, and pointers to solve related programming problems, demonstrating practical problem-solving skills.

CO4: Students will analyze and compare the advantages and disadvantages of using dynamic memory allocation in C, illustrating an understanding of memory management and its impact on data processing.

CO5: Students will create C++ programs that utilize object-oriented principles, including classes, inheritance, and polymorphism, to model and solve related scenarios.

CO6: Students will evaluate and critique C++ code for efficiency and effectiveness, implementing best practices and identifying potential improvements in real-world applications.

Course Contents

Unit I	**Introduction to Programming and Basics of C**	**(5 Hrs)**

Overview of programming concepts and importance in Forensic Science, Basics of C programming language, Data types, variables, and constants, Input and output operations, Control structures: decision-making and looping constructs		
Unit II	**Functions and Modular Programming in C**	**(5 Hrs)**
Understanding functions and their role, Function prototypes and definitions, Parameter passing and return values, Scope and lifetime of variables, Building modular programs		
Unit III	**Arrays and Strings in C**	**(5 Hrs)**
Declaring and initializing arrays, Array manipulation and operations, Introduction to strings in C, String manipulation functions		
Unit IV	**Pointers and Dynamic Memory Allocation in C**	**(5 Hrs)**
Understanding pointers and their applications, Pointer arithmetic and arrays, Dynamic memory allocation and deallocation, Pointers and functions		
Unit V	**Introduction to C++ Programming**	**(5 Hrs)**
Overview of C++ and its features, Classes and objects, Encapsulation, inheritance, and polymorphism, Operator overloading		
Unit VI	**File Handling and Exception Handling in C++**	**(5 Hrs)**
Working with files in C++, Input/output file streams, Exception handling mechanisms, Handling errors in data processing		

Learning Resources

Reference Books:

1. "C Programming Absolute Beginner's Guide (3rd Edition)" by Perry and Miller
2. "C Programming for the Absolute Beginner, Second Edition" by Vine
3. "C Programming for Scientists and Engineers with Applications" by L. Hill, G. McGregor
4. "Programming in C (4th Edition)" by Kochan
5. "C++ Primer (5th Edition)" by Lippman, Lajoie, and Moo
6. "Accelerated C++: Practical Programming by Example" by Koenig and Moo
7. "Effective C++: 55 Specific Ways to Improve Your Programs and Designs (3rd Edition)" by Scott Meyers

MOOC Course:

1. Coursera: Coding for Everyone: C and C++ Specialization - https://www.coursera.org/specializations/coding-for-everyone
2. Effective Programming In C And C++ - https://ocw.mit.edu/courses/6-s096-effective-programming-in-c-and-c-january-iap-2014/

Modules:

Link: https://www.vssut.ac.in/lecture_notes/lecture1424354156.pdf
https://open.umn.edu/opentextbooks/textbooks/144

JSPM University Pune F.Y. M.Sc. Forensic Science Semester II		
Course Type: SEC	**Course Title: DNA Forensics**	
Course Code: 230HFGM13_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 3	**Lecture (L): 2 Tutorial (T): 0 Practical (P): 2 Experiential Learning (EL): 0**	**Practical (PR): 50 Marks Oral (OR): 50 Marks**
Prerequisite Courses, if any: Nil		

Course Objectives:

- Overview of genetic inheritance.
- To Learn about DNA fingerprinting and its application in forensics
- To understand collection techniques for biological samples
- To get insight about DNA fingerprinting its use and applications in Forensic testing
- To learn about different DNA techniques used in Lab
- To analyze the gels used in DNA technique
- Understand what DNA Quantification is and how it is utilized for getting better results

Course Outcomes: On Completion of this course, Students will be able to
CO1: Understand the basic structure of human genome and DNA molecules.
CO2: Understand various DNA typing methods such as RFLP, STR and SNPs with their limitations and advantages
CO3: Understand different methods of extraction of DNA by conventional and recent methods.
CO4: Gain skills in DNA extraction and understand the significance of DNA Profiling in Forensic Sciences
CO5: Capable of performing DNA profiling of any biological samples aiming investigation.

Course Contents

Unit I	Introduction to Genetics	(6 Hrs)

Basic concepts: Genes, base pair, cell, chromosome, nucleus, heredity, allele, dominant, recessive, homozygous, heterozygous, genotype, phenotype, Mendelian Inheritance, Structural and definitive properties of chromosomes, types of chromosomes, packaging of heredity material, Concept of euchromatin and heterochromatin. Genes and related sequences, non- coding sequences. Polymorphism, Structure of DNA and RNA, Overview of DNA replication, transcription and translation. History of DNA fingerprinting.

Unit II	Mitochondrial analysis and sample collection	(7 Hrs)

Forensic Mitochondrial Analysis: Comparison of mitochondrial and nuclear DNA maternal inheritance and its genome organization. Y chromosome and gender typing. Sample collection: DNA sample sources, biological evidence at crime scenes, evidence collection and preservation, Collection of reference DNA samples, sample storage and transport of DNA evidence, Sample characterization: blood stain, saliva stains, semen stains, contamination concerns

Unit III	**DNA Extraction and Quantification**	**(8 Hrs)**

DNA extraction methods: Basic Principles, Method of DNA extraction (Physical, chemical and biological). organic (Phenol-chloroform) extraction, chelex extraction, FTA paper, Solid phase DNA extraction methods: Qiagen extraction Chemistry and kits, Differential extraction. Introduction to Polymerase Chain Reaction and its applications. Genes and DNA markers in forensic DNA analysis - STR, VNTR, SNP. Introduction to RFLP. DNA IQ (Identification & quantification), Electrophoretic Methods - Agarose gel, SDS-PAGE, Southern /Northern Blotting, Slot Blot Assay, DNA databasing.

Unit IV	**DNA Profiling Applications & Case Studies**	**(7 Hrs)**

DNA profiling applications & case studies in disputed paternity cases, child swapping, missing person's identity, civil immigration, veterinary, wild life and agriculture cases, Legal perspectives – legal standards for admissibility of DNA profiling – procedural & ethical concerns, status of development of DNA profiling in India & abroad, Limitations of DNA profiling, Population databases of DNA markers –STRs, Mini STRs, SNPs. New & future technologies

Unit V	**Experiment - I**	**(9 Hrs)**

I. To collection biological samples for DNA Analysis
II. To carry out the separation of amino acids by thin layer chromatography
III. To handle micropipette and understand sterilization techniques
IV. DNA Extraction from nails and hair root
V. Organic Extraction of DNA from Blood
VI. To extract DNA from different Body Fluids
VII. Estimation of DNA and RNA by UV absorption method and determination of purity of nucleic acids

Unit VI	**Experiment - II**	**(8 Hrs)**

I. To preparation of gel plates for electrophoresis
II. To perform Polyacrylamide Gel Electrophoresis
III. To carry out electrophoresis for separation of enzymes
IV. To prepare a report on the role of DNA typing in solving paternity disputes
V. Differential centrifugation for separation of epithelial cell from sperm
VI. Retrieve DNA sequence from database (NCBI) National Center for Biotechnology Information
VII. To Perform Polymerase Chain Reaction

Learning Resources

Reference Books:

1. An Introduction to Forensic DNA Analysis, Rudin, Norah CRC Leviw Publishers, (2002)
2. An Introduction to Forensic DNA Analysis, Inman, Keith CRC Press, (1997)
3. Basics of DNA and Evidentiary Issues, Vij, Krishan Jaypee Brothers, (2004)
4. DNA, forensic and legal applications Kobilnsky, Lawrence John Wiley & Sons, (2005)
5. DNA Evidence and Forensic Science, Newton, David E. Viva books private limited, (2010)
6. DNA fingerprinting, Kirby, Lorne W H Freeman and Co, (1992)
7. DNA Fingerprinting: Approaches and applications. T. Burke, Terry Birkhauser Verlage, (1991)
8. DNA in forensic science, Robertson, J Ellis Horwood Ltd., (1990)
9. DNA profiling and DNA fingerprinting, Epplen, Jorg T Birkhauser Verlage,(1999)
10. DNA tests in Criminal Investigation Trial & Paternity Disputes Singh, Yashpal, Alia Law
11. Forensic DNA analysis, J. Thomas McClintock Lewis Publications, (2008) 19. Forensic DNA typing protocol: Carracedo
12. Forensic DNA Typing, J.M. Butler, Elsevier, Burlington (2005).

MOOC Course: Forensic Science: DNA Analysis by Susan Gurney, University of Cambridge. **https://www.mooc-list.com/search/node?keys=DNA**

Modules:
Link: https://archive.nptel.ac.in/courses/102/103/102103017/

JSPM University Pune

F.Y. M.Sc. Forensic Science

Semester II

Course Type: VSC	**Course Title: Innovation**	
Course Code: 230IINB02_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 1.5	**Lecture (L): 1** **Tutorial (T): 0** **Practical (P): 0** **Experiential Learning (EL): 2**	**Oral (OR): 50 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- To understand the concept of innovation and creativity
- To familiarize with the tools for innovation
- To understand fundamentals of innovation management
- To get overview of real-world implementation of innovation and creativity

Course Outcomes: On completion of the course, learner will be able to…
CO1: apply the concepts of creativity and innovation in all walks of life.
CO2: inculcate and incorporate individual creativity and innovative skill set at conceptual, product design and management level.
CO3: solve real time problems with enhanced ability in respective sectors of work for increased productivity and improved organizational behaviour.
CO4: perform with improved skill set in entrepreneurship and start up ecosystem.
CO5: to find solutions to social, corporate and personal problems with de novo approach.

Course Contents

Unit I	**Innovation & Creativity**	**(3 Hrs)**

Innovation: Meaning, Concept, Characteristics, Importance, Principles of Innovation, Process of Innovation.
Creativity: Meaning, Concept, Importance, Creativity Process, Components of creative performance, Hurdles to Creativity

Unit II	**Tools for Innovation**	**(5 Hrs)**

Creative Thinking: Traditional V/S Creative Thinking,
Individual Creativity Techniques: Meditation, Self-Awareness, & Creative Focus
Group Creative Techniques: Brainstorming, Off The Wall Thinking &Thinking Hats Method.
Dimensions of Innovation:
Innovation Eco-system in India and abroad, Social Innovation, Grass root Innovation, Frugal Innovation, Global Innovation- Global Innovation Index framework, GII, Case studies

in India and abroad.		
Unit III	**Innovation Management**	**(3 Hrs)**
Concept, Scope, Characteristics, Evolution of Innovation Management, Significance, Factors Influencing Innovation, Commercialization of Innovation, Innovation and Start up ecosystem		
Unit IV	**Areas of Innovation**	**(2 Hrs)**
Innovation in Entrepreneurship, Product innovation, Process Innovation, Social Innovation, Case studies highlighting types, implementation imperatives and sector specific impact.		
Unit V	**Group Innovation Study**	**(1 Hrs)**
Each student group will prepare a case study on one innovation topic either from their area of work or through participation in the exposition, symposia, workshop of any relevant forum. The project report will be submitted for the study.		
Unit VI	**Presentation and Closure**	**(1 Hrs)**
The student group will give the presentation of the project in the chosen area. The report will highlight the process of exploring executing and exploiting the innovation. It will also mention methodology to manage the innovation.		

Learning Resources

Text Books:

1. Wagner, Tony. Creating Innovators: The Making of Young People Who Will Change the World. New York: Scribner, 2012.
2. "Managing Creativity and Innovation" Harvard Business School Press

Reference Books:

1. "Organizational Innovation", SAGE Publication, London, 2001.
2. "Jugaad Innovations, Navi Radjou and Jaideep Prabhu, Random House India
3. "Kelley, Tom, Jonathan Littman, and Tom Peters. The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm. New York: Doubleday, 2001.
4. "Innovation Management & New Product Development", Paul Trott, published by Pitman, 2000.

MOOC / NPTEL Courses:

1. NPTEL Course "*Innovation, Business Models and Entrepreneurship",* Prof Rajat Agrawal, Prof Vinay Sharma, IIT Roorkee.

Link of the Course: https://onlinecourses.nptel.ac.in/noc23_mg116/preview

Additional Web Resources:

https://youtu.be/FXJUDyqobbM
https://youtu.be/FF_38_ZuRbQ
https://youtu.be/33JjV_NDbpY
https://youtu.be/DNUwZctwwhw
https://youtu.be/_PC1qbAhKz0
https://youtu.be/wbFVNBNl7Bk
https://youtu.be/kfpERveB8kM
https://youtu.be/Y6R9ps2E1oM
https://youtu.be/66N5SM73AEc
https://youtu.be/1YLtkc6U3Rs

JSPM University Pune F.Y. M.Sc. Forensic Science Semester II		
Course Type: AEC	**Course Title: Business Communication**	
Course Code: 230UENM02_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2	**Lecture (L): 1 Tutorial (T): 0 Practical (P): 2 Experiential Learning (EL): 0**	**Theory (TH): 50 Marks**

Prerequisite Courses, if any: Nil

Course Objectives:

- Remember the theoretical basics of Communication.
- Understand skills required for efficient interpersonal communication and leadership abilities.
- Apply Presentation Techniques in the Professional Environment.
- Analyze trends in the respective market to accommodate accordingly.
- Evaluate the skills related to production & presentation of messages in multiple formats.
- Create placement ready personalities.

Course Outcomes: On completion of the course, learner will be able to

CO1: Apply Verbal and Non-Verbal Communication Techniques in the Professional Environment

CO2: write impressive official correspondence and learn to make and give effective presentations in a professional environment.

CO3: Write an impressive resume and face the interview confidently.

CO4: Present themselves well in front of large audience on a variety of situations related to group communication and presentation in a relevant scenario.

CO5: Socialize with ease and comfort.

CO6: Develop Corporate Communication Skills

Course Contents

Unit I	Employment Communication	(2 Hrs)

Introduction and objectives of Report Writing, Types of Business Reports-Informational Reports, Analytical Report, Research Report, Progress Report, Explanatory Report, Structure of Reports- Title page, table of content, summary, the main body, conclusion, and recommendations, Writing Abstracts and Summaries

Unit II	Resume Writing	(2 Hrs)

Introduction to Resume Writing- Concept and Details, Types of Resume Writing- chronological and functional, Key components of effective Resume Writing, Structure and contents of Cover Letter		
Unit III	**Interview Skills / Techniques**	**(3 Hrs)**
Interview Skills / Techniques – Concept and Process, Peer Interview/Mock Interview- Pre-interview planning and performance, Opening Strategies and Answering Strategies, Interview through tele and video- conferencing		
Unit IV	**Group Discussion**	**(3 Hrs)**
Group Discussion – Concept and important points, Roles and Phases in Structured Group Discussion, Expectations of the Panel, Do's and Don'ts in Group Discussion		
Unit V	**Presentation Skills**	**(2 Hrs)**
Elements of Presentation- Content, Organization, Delivery, Design of Presentation- Typography, colour, layout, images and animation, Oral Presentations (individual or group) through JAM Sessions/Seminars/PPTs, Written Presentations through Posters/Projects/Reports/ E-mails/Assignments		
Unit VI	**Essential Soft Skills**	**(3 Hrs)**
Soft Skills development- Grooming Etiquettes and Manners, Stress and Conflict Management- Coping styles and symptoms, Time Management- Pomodoro Technique, Pareto Technique, Leadership Skills- Definition, Strategies, and Styles		

Learning Resources

Textbooks:

1. Bovee, Courtland L, John V. Thill & Barbara E. Schatzman. *Business Communication Today*: Tenth Edition. New Jersey: Prentice Hall, 2010.

Reference Books:

1. Collins, Patrick. *Speak with Power and Confidence*. New York: Sterling, 2009.
2. Barun, Mitra. Personality Development and Soft Skills, Barun K Mitra, Oxford Press, 2011.

MOOC / NPTEL Courses:

1. NPTEL Course "Soft skill Development" Prof. Priyadarshi Patnayak, Prof. V.N, Giri, Prof. D. Suar, IIT Kharagpur

Link of the course: https://youtu.be/Af9RoDvhTLE?si=cqQim2DX2Cepi0eX

Additional Web Resources:

http://www.englishdaily626.com/c-errors.php
https://www.stressdirections.com/personal/about_stress/stress_statistics.html

JSPM University Pune F.Y. M. Sc. Forensic Science Semester II		
Course Type: AEC	**Lab Course Title: Business Communication**	
Course Code: 230UENM02_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2	**Lecture (L): 1** **Tutorial (T): 0** **Practical(P): 2** **Experiential Learning (EL): 0**	**Theory (TH): 50 Marks**
Prerequisite Courses, if any: -		

List of Laboratory Experiments	
Group A	
1.	Report Writing
2.	Resume Writing
3.	Interview technique
4.	Group Discussion
5.	Presentation Skills
Group B	
6.	Soft Skills: Grooming, Etiquettes and Manners
7.	Stress Management
8.	Time Management
9.	Leadership Skill
10.	PowerPoint Presentation
Virtual LAB Links:	

JSPM University Pune F.Y. M.Sc. Forensic Science Semester II		
Course Type: RMC	**Course Title: Research in Forensics**	
Course Code: 230IRMM06_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 2	**Lecture (L): 2 Tutorial (T): 0 Practical (P): 0 Experiential Learning (EL): 0**	**Theory (TH): 50 Marks**
Prerequisite Courses, if any: Nil		

Course Objectives:

- To familiarize the students with statistical methods
- To establish a strong understanding of the foundational principles of research ethics, integrity, and the responsible conduct of research
- To acquaint students with the statistical tests in research
- To familiarize students with application of computers and different software used in research

Course Outcomes: Students completing the course will be able to:

CO1: With the help of this course, students will be able to take up and implement proper statistical methods

CO2: The course will enable them to understand Data processing methods and analysis

CO3: The students will develop skills in tests of hypothesis used in research

CO4: Students will be able to demonstrate the ability to use computer, Applications and software's effectively

CO5: Students will understand various ethics followed during research process

Course Contents

Unit I	Basic Concepts of Statistics	(3 Hrs)

Basic definitions and applications of statistics, sampling: Representative sample, sample size, sampling bias and sampling techniques. Classification of data, methods of collection of primary and secondary data.

Unit II	Presentation of Data	(4 Hrs)

Frequency Distribution (Simple and Grouped), methods of data presentation-graphical representation by histogram, polygon, ogive curves and pie diagram.

Unit III	Measure of Central Tendency and Dispersion	(10 Hrs)

Measures of central tendency: mean, median and mode; Measures of dispersion: range, mean deviation, standard deviation, variance, quartile, coefficient of variation; Karl-Pearsons coefficient of skewness. Correlation and regression: positive and negative correlation, Karl-Pearsons coefficient of correlation.		
Unit IV	**Probability**	**(5 Hrs)**
Introduction to probability theory, various definitions of probability, Basic terms: random experiments, event, trial, sample space, independent and mutually exclusive events; conditional probability, Addition and multiplication theorem, Baye's theorem.		
Unit V	**Test of Hypothesis**	**(4 Hrs)**
Distribution of data: normal, binomial and Poisson distribution. Test of hypothesis: introduction and concepts; test for small and large sample: Z-test, t-test, chi square test, F-test and ANOVA. Software related to statistical analysis: MS-Excel, SPSS etc.		
Unit VI	**Research Quality and Ethics**	**(4 Hrs)**
Measuring research impact and quality: JCR report, impact factor and citation index, ethics and scientific conduct. Plagiarism: definition, forms, consequences, unintentional plagiarism, copyright infringement, collaborative work.		

Learning Resources

Reference Books:

1. Statistics in Biology, (1967) Vol. 1: Bliss, C.I.K. McGraw Hill, NewYork.
2. Practical Statistics for experimental biologist (1985): Wardlaw, A.C.
3. Statistical Methods in Biology (2000): Bailey, N.T. J. English Univ. Press.
4. Biostatistics - 7th Edition : Daniel
5. Fundamental of Biostatistics : Khan
6. Bio-statistical Methods : Lachin
7. Statistics for Biologist (1974):Campbell R.C. Cambridge
8. Research Methodology Tools And Techniques : H.C Purohit
9. Research Methodology - Ranjit Kumar
10. Research Methodology: Methods & Techniques - Kothari, C.R.
11. Research Methodology by Wilkinson and Bhadarkar:
12. Statistical Methods by Gupta S.P. (2008).

JSPM University Pune F.Y. M.Sc. Forensic Science Semester II		
Course Type: LC	**Course Title: Forensic Chemistry, Toxicology and Medicine Lab**	
Course Code: 230HFGM17_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 1	**Lecture (L): 0** **Tutorial (T): 0** **Practical (P): 2** **Experiential Learning (EL): 0**	**Practical (PR): 50 Marks**
Prerequisite Courses, if any: - Nil		

List of Laboratory Experiments	
Group A	
1.	Preparation of the Normal, Molar and Standard & Buffer Solutions.
2.	Colour/spot tests for common drugs of abuse.
3.	TLC separation of drugs of abuse.
4.	TLC separation of pesticides/insecticides.
5.	TLC separation of anabolic steroids.
Group B	
6.	Identification of NDPS drugs by spectroscopic methods.
7.	Identification of commonly encountered inorganic poisons Arsenic, Antimony, Bismuth, Mercury by colour test and microscopic examination.
8.	Identification of ethyl alcohol and methyl alcohol by colour tests and microscopic examination
9.	Determination of pH of a solution using pH meter.
10.	Extraction, isolation and analysis of metallic and non-metallic poison from biological sample/food material.
Group C	
11.	Extraction, isolation and analysis of alcohol from biological sample/suspected bottle.
12.	Extraction, isolation and analysis of acidic/basic drug/poison from biological sample/ food material.
13.	Analysis of phenolphthalein in trap cases.
14.	Plant, animal, Metallic poison analysis.
15.	Separation of sampling Material by TLC (drugs, poison etc.)
16.	To study post-mortem findings of a cadaver.

JSPM University Pune F.Y. M.Sc. Forensic Science Semester II		
Course Type: LC	**Course Title: Forensic Biology and Serology Lab**	
Course Code: 230HFGM18_02	**Teaching Scheme: Hrs./Week**	**Examination Scheme:**
Credits: 1	**Lecture (L): 0** **Tutorial (T): 0** **Practical (P): 2** **Experiential Learning (EL): 0**	**Practical (PR): 50 Marks**
Prerequisite Courses, if any: Nil		

List of Laboratory Experiments

Group A

1. To determine blood group from fresh blood samples.
2. Examination of blood stain (Presumptive and confirmatory)
3. To identify the given stain as saliva
4. To perform presumptive test for semen
5. To carry out microscopic examination of pollen grains.

Group B

1. To carry out microscopic examination of diatoms.
2. Examination of seminal stage and microscopic examination of spermatozoa
3. Examination of hair of different animals as cat, dog, cow, horse and goat
4. To study identification and description of bones and their measurements.
5. To determine sex from pelvis

Group C

1. To perform agglutination-based assays
2. Separation of hemoglobin by gel filtration
3. Collection, Identification, and preservation of entomological evidence
4. To perform Pug mark identification
5. To prepare a case report on problems of wildlife forensics

JSPM University Pune F.Y. M.Sc. Forensic Science Semester II		
Course Type: IITP / FP/CEP	**Lab Course Title: Internship/Field Project/Community Engagement Programme**	
Course Code: 230HFGM23_02	**Teaching Scheme: (Hrs./Week)**	**Examination Scheme:**
Credits: 2	**Duration: 04 to 06 Weeks**	**Oral (OR): 50 Marks**

Prerequisite Courses, if any: -

Objectives: Learners will be able to

- To expose students to the industrial environment, which cannot be simulated/experienced in the classroom and hence creating competent professionals in the industry and to understand the social, economic and administrative considerations that influence the working environment of industrial organizations.
- To provide students with an opportunity to apply theoretical knowledge from academics to the realities of the field work/training.
- To providing practical experience in a field or discipline

Course Outcomes: On completion of the course, learner will be able to

CO1: Develop professional competence through internship.
CO2: Apply academic knowledge in a personal and professional environment.
CO3: Build the professional network and expose students to future employees.
CO4: Apply professional and societal ethics in their day-to-day life.
CO5: Become a responsible professional having social, economic, and administrative considerations.
CO6: Decide own career goals and personal aspirations.

Duration and Evaluation:

- Internship to be completed after every even semester (2, 4 and 6) and before commencement of next odd semester (03, 05 and 07).
- Internship should be at least 4 to 6 weeks and it is to be assessed immediately after completion.

Framework of Internship/ Field Project / Community Engagement Programme:

- During the vacation after even semester, students are ready for industrial experience. Therefore, they may choose to undergo Internship / Field Project / Community Engagement Project
- Students may choose either to work on innovation or entrepreneurial activities resulting in start-up or undergo internship with industry/ NGO's/ Government organizations/ Micro/ Small/ Medium enterprises to make themselves ready for the

industry.

- Every student is required to prepare a file containing documentary proofs of the activities done by him.
- The evaluation of these activities will be done by Programme Coordinator/ Project Head / faculty / TPO/ mentor or Industry Supervisor.

Internship Guidelines:

Step 1: The department will issue request Letter/ Email to the respective industry/ firm/ NGO/ organization to allot various slots of 4-6 weeks as internship**/** Field Project / Community Engagement Project periods for the students.

Step 2: Industry will confirm the training slots allocated for internships via Confirmation Letter/ Email.

Step 3: Students on joining Training at the concerned Industry / Organization, submit the Joining Report/ Letters / Email.

Step 4: Students undergo industrial training/ Field Project / Community Engagement Project at the concerned Industry / Organization. In- between Faculty Member(s) can evaluate(s) the performance of students once/twice by visiting the Industry/Organization and Evaluation Report of the students is submitted in department.

Step 5: Students will submit training report after completion of internship.

Step 6: Training Certificate to be obtained from industry / Organization.

Internal Reporting Guidelines for students:

- Every intern should send weekly report to their internal guide without fail. It is mandatory for the intern to send weekly reports to their respective guide on regular basis.
- Interns should have at least fortnightly verbal communication with the internal guide without fail.
- In cases where in the company wants to secure their confidential information in the project / internship report, the internal guide should duly co-ordinate with the respective mentor/reporting manager on the method of reporting to assure that no information will be leaked outside and is purely for academic purposes.

Internship Diary / Internship Workbook:

- Students must maintain Internship Diary/ Internship Workbook. The main purpose of maintaining diary/workbook is to cultivate the habit of documenting. The students should record in the daily training diary account of the observations, impressions, information gathered and suggestions given, if any.
- The training diary/workbook should be signed after every day by the supervisor/ in charge of the section where the student has been working.
- Internship Diary/workbook and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the Institute immediately after the completion of the training.

Internship Diary / workbook may be evaluated on the basis of the following criteria:

- Proper and timely documented entries.
- Adequacy & quality of information recorded
- Data recorded.

- Thought process and recording techniques used.
- Organization of the information.

Internship Work Evaluation:

- Every student is required to prepare and maintain documentary proofs of the activities done by him / her as internship diary or as workbook.
- The evaluation of these activities will be done by Programme Coordinator/ Project Head / faculty / TPO/ mentor or Industry Supervisor based on- overall compilation of internship activities, sub-activities, the level of achievement expected, evidence needed to assign the points and the duration for certain activities.

Evaluation-Seminar presentation / Oral Examination at the institute:

The student will present a seminar based on his training report, before an expert committee constituted by the concerned department as per norms.

The evaluation will be based on the following criteria:

- Depth of knowledge and skills Communication & Presentation Skills.
- Team Work
- Creativity
- Planning & Organizational skills
- Adaptability and Analytical Skills
- Attitude & behaviour at work.
- Societal Understanding
- Ethics
- Regularity and punctuality
- Attendance record
- Log book
- Student's Feedback from External Internship Supervisor

- **Internship Report:**
- The report shall be presented covering following recommended fields but limited to:
- Title/Cover Page
- Internship completion certificate.
- Internship Place Details- Company background-organization and activities/Scope and
- object of the study / personal observation.
- Index/Table of Contents
- Introduction
- Title/Problem statement/objectives
- Motivation/Scope and rationale of the study
- Methodological details
- Results / Analysis /inferences and conclusion
- Suggestions / Recommendations for improvement to industry, if any
- Attendance Record
- List of reference (Library books, magazines and other sources)

Feedback from internship supervisor (External & Internal):

Post internship, faculty coordinator should collect feedback about student with following recommended parameters:

- Technical knowledge
- Discipline
- Punctuality
- Commitment
- Willingness to do the work
- Communication skill
- Individual work
- Team work
- Leadership

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