# Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058-India
(Autonomous Institute Affiliated to University of Mumbai)

| Course Code | Course Name | Teaching Scheme (Hrs/week) | | | Credits Assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | L | T | P | Total |
| ETL921 | Digital Forensic | 4 | - | - | 4 | -- | - | 4 |
| | | Examination Scheme | | | | | | |
| | | ISE | | MSE | | ESE | | Total |
| | | 20 | | 20 | | 60 | | 100 |

| Pre-requisite Course Codes | | |
|---|---|---|
| After successful completion of the course, student will be able to | | |
| Course Outcomes | CO1 | Describe the fundamentals of Digital Forensic and systematic process of collection of digital evidences. |
| | CO2 | Analyze and use various forensics toolkits. |
| | CO3 | Analyze perspectives of digital forensic investigation in various applications/portable devices like Windows/Unix/Android system, networks based etc. |
| | CO4 | Generate legal evidences and supporting investigation reports. |

| Module | Topics | Ref. | Hrs |
|---|---|---|---|
| 1 | **Introduction to Digital Forensics**: computer crimes, evidence, extraction, preservation, etc.<br>Overview of hardware and operating systems: structure of storage media/devices; windows/Macintosh/ Linux -- registry, boot process, file systems, file metadata. | 1,2 | 8 |
| 2. | **Data recovery:** identifying hidden data, Encryption/Decryption, Steganography, recovering deleted files.<br>**Digital evidence controls:** uncovering attacks that evade detection by Event Viewer, Task Manager, and other Windows GUI tools, data acquisition, disk imaging, recovering swap files, temporary &cache files<br>**Computer Forensic tools:** Encase, Helix, FTK, Autopsy, Sleuth kit Forensic Browser, FIRE, Found stone Forensic ToolKit, WinHex, Linux dd and other open source tools. | 1,2 | 12 |
| 3. | **Network Forensic:** Collecting and analyzing network-based evidence, reconstructing web browsing, e-mail activity, and windows registry changes, intrusion detection, tracking offenders, etc.<br>**Mobile Network Forensic:** Introduction, Mobile Network Technology, Investigations, Collecting Evidence, Where to seek Digital Data for further Investigations, Interpretation of Digital Evidence on Mobile Network. | 1,2,4 | 10 |

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| | | | |
|---|---|---|---|
| 4. | **Software Reverse Engineering:** defend against software targets for viruses, worms and other malware, improving third-party software library, identifying hostile codes-buffer overflow, provision of unexpected inputs, etc. | | 5 |
| 5. | **Computer crime and Legal issues:** Intellectual property, privacy issues, Criminal Justice system for forensic, audit/investigative situations and digital crime scene, investigative procedure/standards for extraction, preservation, and deposition of legal evidence in a court of law. | 1,2,3 | 7 |
| | Total | | 42 |
| | | | |
| | | | |

**Reference Books:**


1. ***Digital Forensics with Open Source Tools.*** Cory Altheide and Harlan Carvey, ISBN: 978-1-59749-586-8, Elsevier publication, April 2011
2. ***Computer Forensics and Cyber Crime: An Introduction*** *(3rd Edition)* by Marjie T. Britz, 2013.
3. ***Network Forensics: Tracking Hackers Through Cyberspace***, Sherri Davidoff, Jonathan Ham Prentice Hall, 2012
4. Digital Forensic, Dr. Nilakshi Jain and Dr. D. Kalbande, Wiley Publications


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| Course Code | Course Name | Teaching Scheme (Hrs/week) | | | Credits Assigned | | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | L | T | P | Total |
| ETL922 | Network Security | 4 | - | - | 4 | -- | - | 4 |

| Examination Scheme | | | |
|---|---|---|---|
| ISE | MSE | ESE | Total |
| 20 | 20 | 60 | 100 |

| Pre-requisite Course Codes | | |
|---|---|---|
| After successful completion of the course, student will be able to | | |
| Course Outcomes | CO1 | Describe security threats and apply security techniques using cryptosystems. |
| | CO2 | Explain the key terms and concepts in cyber law, intellectual property and cyber crimes, trademarks and domain theft |
| | CO3 | Build and configure firewall and intrusion detections systems' using GNU open source security tools. |
| | CO4 | Incorporate approaches for incident analysis and response, for risk management and best practices and digital evidence collection, and evidentiary reporting in forensic acquisition |

| Module | Topics | Ref. | Hrs |
|---|---|---|---|
| 1 | **Introduction to Network and Cybersecurity:**<br>Need for network security, Attacks and Their classification<br>Network Vulnerabilities and control<br>Security services and mechanisms,<br>Impact of Security on Enterprises<br>Risk Factors and Cost Analysis. | 1,2,3 | 8 |
| 2. | Introduction to Cryptography Algorithms:<br>Classical and modern cryptography, stream and block ciphers,Messagedigest,digital signature, digital certificate,certificate authority, cryptanalysis<br>DES/AES/RSA/RC4/MD5/SHA algorithms<br>Secure protocols SSL, IPSec, VPN,PKI<br>Implementing security using symmetric and Public-Key crytography.<br>Steganography and DRM | 1,2,3 | 12 |
| 3. | **Ethical Hacking and Network defences**<br>Cybercrimes, Cybercriminals, Cyberoffences, Cybercrimes in Mobile and Wireless Devices, Tools and Methods used in Cybercrimes<br>Network reconnaissance, scanning and sniffing, gaining access.<br>Security Technologies:Firewall, IDS and Antivirus, | 6,7 | 10 |

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|---|---|---|---|
| | Reverseproxy<br>L7 content filtering firewall, NAT & reverse proxy, Firewalldeployment and limitations, selection of firewalls. Performance analysis of firewall. Signature and Anamoly based IDSs, IDS deployment, zone diagram, performance analysis of IDS, strengths and Limitations of IDS. | | |
| 4. | Advanced Security Techniques:<br>Captcha, QR code, OTP, multi-factor authentication etc | 8,9 | 5 |
| 5. | System Security and Case-Studies:<br>Security Operations Center (SOC), Network Operations Center (NOC)<br>Network Security Audit<br>SET, Biometric Security,<br>Digital Immune System | 6 | 7 |
| | Total | | 42 |
| | | | |

**References:**


[1] Cryptography and Network Security by BehrouzForouzanMcGrawHill Publications
[2] Security in Computing by Pfleeger and Pfleeger, Pearson Publications
[3] Management of Information Security by M. Whitman Cengage Publications
[4] Cryptography and Network Security by B. Menzanes, Elsevier
[5] Computer Security by Matt Bishop, Pearson Publication
[6] Cryptography and Network Security by William Stallings, Pearson publications.
[7] Cyber Security by Nina Godbole, John Wiley Publications
[8] http://www.nacs.org/LinkClick.aspx?fileticket=D1FpVAvvJuo%3D&tabid=1426&mid=4802
[9] All about CAPTCHAS , Benjamin Boyter, Publisher amazon


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