**Principles of Data and System Security**

**Syllabus:**

* **Concepts of Security**: Confidentiality, Containment, isolation, Privacy, Anonymity, psuedo- anonymity etc., Policy specification, User authentication, Session management, multi-level security, multi-lateral security
* **Security Models for Information Systems**: Bell la Padua, Biba, Clark-Wilson, Lattice Model, Chinese Wall Model
* **Access Control**: Mandatory Access Control, Discrete Access

Control, Principles of Least Privilege, Distributed Access Control , Role based Access, Attribute Based Access, Key Management, SPKI/SDSI

* + **Information Flow Models**: Distributed Information Control, DIFC, Declassification, Non-Interference, RWFM Models, Information Flow Diagrams,
  + **Application to analysis of protocols, Protocol Specification and Verification**
  + **Database Access Control, Applications to IoT security**
  + **Security and Privacy:** Issues and Challenges – applications, conference systems, privacy compliance in healthcare systems
  + **Attacks and Vulnerabilities**: Static and Dynamic attacks, Malware analysis and Counter measures- difficulties, approaches, defense against untrusted code, exploiting Vulnerabilities, penetration tests
* **OS Security:** Principles, Secure OS types, run-time monitoring, secure OS like SELINUX, Secure OS based on IFC
* **Language based security:** Program analysis for Security, secure code practices and tools for secure code writing
* **Security Mechanisms**: Protection, Confinement, Isolation, Virtual machines, Non-interference Dealing with legacy code, Sandboxes, Separability, Data caging
  + **Web security models**: application security, Browser Security, Information flow browsers
  + **BlockChains: Applications, Currency realization – Bitcoins**
  + **Special Topics:** Mobile phone security, Android Security, Cloud security etc.

**Texts and References:**

1. **Text Books**
2. Security Engineering: A Guide to Building Dependable Distributed Systems, Ross Anderson, 2nd Edition, Wiley, 2008, SBN: 978-0-470-06852-6
3. Cryptography and Data Security – Dorothy Denning, Addison Wesley, 1988
4. Computer Security Art and Science – Matt Bishop, ISBN-13: 978-032124744
5. Building a Secure Computer System –Morrie Gasser, **ISBN-13:** 978-0442230227
6. **Research Papers/ chapter**s

**Teaching Assistants:**

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