Guidelines for DSE/GE: Data Privacy

Topic	Hours	Ch(s) and Section(s)	Ref(s)
Introduction to Data Privacy and Privacy Regulations: • Notion of data privacy, • Historical context of data privacy, • Types of sensitive data, • Privacy laws and regulations.	20	Ch-1 upto Sec 1.2 Ch-1 upto pg 8 Ch-2: 2.1 upto pg 33, Ch 3: 3.4, Ch 14: 14.1-14.4 Ref [5] complete	[3] [4] [2] [5]
Data Privacy Attacks, Cryptography and Data Protection: • Type of Attacks/ Data Breaches on Data Privacy, • Impact of Data Breaches / Attacks, • Introduction to cryptography, • Symmetric and asymmetric encryption, • Hashing and digital signatures.	12	Ch-1 till Sec 1.11	[2]
Data Collection, Use and Reuse: • Harms Associated with Data collections, use and reuse, • Introduction to data anonymization, • Data Anonymization Techniques for anonymizing data, • Challenges in anonymizing data	8	Ch-3: Sec II Ch-1: Section 1.4-1.7	[1] [3]
Ethical considerations in Data Privacy: • Privacy and Surveillance, • Ethics of Data Collection and Use, • Bias and discrimination in data analysis	5	Ch-3: Sec III, IV	[1]

References:

1. Ronald Leenes, Rosamunde van Brakel, and Serge Gutwirth: *Data Protection and Privacy: The Age of Intelligent Machines*, Hart Publishing, 2017.
2. Stallings, William. *Information privacy engineering and privacy by design: Understanding privacy threats, technology, and regulations based on standards and best practices*. Addison-Wesley Professional, 2019.
3. Venkataramanan, Nataraj, and Ashwin Shriram. *Data privacy: principles and practice*. Chapman and Hall/CRC, 2016.
4. Jarmul, Katharine. *Practical Data Privacy*. " O'Reilly Media, Inc.", 2023.

Additional References

5. THE DIGITAL PERSONAL DATA PROTECTION ACT, 2023 (https://www.meity.gov.in/writereaddata/files/Digital%20Personal%20Data%20Protection%20Act%202023.pdf)
6. Ravinder Kumar Gaurav Goyal, *The Right to Privacy in India: Concept and Evolution*, Publisher: Lightning Source, 2016.
7. https://onlinecourses.nptel.ac.in/noc22_cs37/preview
8. https://www.coursera.org/learn/northeastern-data-privacy/home/info
9. Naavi: *Personal Data Protection Act of India (PDPA 2020)*: Be Aware, Be Ready and Be Compliant, Notion Press, 2020.

Suggested Practical List (using Python):

1. Write a program to perform encryption and decryption using Caesar cipher (substitutional cipher).
2. Write a program to perform encryption and decryption using Rail Fence Cipher (transpositional cipher)
3. Write a Python program that defines a function and takes a password string as input and returns its SHA-256 hashed representation as a hexadecimal string.
4. Write a Python program that reads a file containing a list of usernames and passwords, one pair per line (separated by a comma). It checks each password to see if it has been leaked in a data breach. You can use the "Have I Been Pwned" API (https://haveibeenpwned.com/API/v3) to check if a password has been leaked.
5. Write a Python program that generates a password using a random combination of words from a dictionary file.
6. Write a Python program that simulates a brute-force attack on a password by trying out all possible character combinations.
7. Demonstrate the usage/sending of a digitally signed document.
8. Students needs to conduct a data privacy audit of an organization to identify potential vulnerabilities and risks in their data privacy practices.
9. Students needs to explore the requirements of the Data Protection Regulations and develop a plan for ensuring compliance with the regulation.
10. Students needs to explore ethical considerations in data privacy, such as the balance between privacy and security, the impact of data collection and analysis on marginalized communities, and the role of data ethics in technology development.

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