1. **Aim**

The course covers classical and new topics related to databases security. As one of the most important aspects of database security is access control of subjects (users/clients/agents/…) to objects (data/code/devices/…), the main part of the course focuses on Access Control models including Mandatory, Discretionary, and Role-Based. Such models are investigated from the Secrecy and Integrity aspects of security in database systems. In addition to Relational Databases as the dominant model in the industry and academia, the new non-relational database models such as Statistical, Object-Oriented, and XML-based are studied from the security perspective. Database outsourcing and Oracle security are also discussed as the final parts of the course.

2. **Outline**

The course is divided into 12 chapters as follows.

1. **Introduction**
   a. An introduction to database systems (concepts, components, query, advantages of databases vs. filing perspective).
   b. Security requirements (confidentiality, integrity, audit-ability, authentication, reliability, and availability)
2. **Security Models**
   a. Access control
   b. Inference and covert channels
   c. Open/close policy
   d. Discretionary/mandatory access control
3. **Discretionary Access Control Models**
   a. Matrix-based models
   b. Graph-based models
   c. Discretionary models specific to databases
4. **Mandatory Access Control Models**
   a. Secrecy-preserving models
   b. Integrity-preserving models
   c. Multi-level databases access control models
   d. Multi-level secure DBMS architecture
5. **Role-based Access Control Models**
   a. Role-based models
   b. Administrative role-based access control model
6. **Statistical Databases Security**
   a. Conceptual techniques
   b. Restrictive techniques
   c. Perturbation techniques

7. **Security Models for Next Generation Databases**
   a. Access control in object-oriented databases
   b. Access control in XML-based databases
   c. Access control in ontology-based databases

8. **Privacy-Preserving Databases**
   a. Hippocratic databases
   b. Privacy in database publishing

9. **Audit Mechanisms in Relational Databases**
10. **Secure Database Architecture**
11. **Oracle Security Mechanisms (as a case study)**

3. **Evaluation Criteria**
   1. Assignments: 10%
   2. Mid-term exam: 30%
   3. Survey paper: 20%
   4. Final Exam: 40%

4. **References**

Additional references


