**Software Design & Analysis**

**OOP**

1. **Encapsulation:**

The meaning of **Encapsulation**, is to make sure that "sensitive" data is hidden from users. To achieve this, you must declare class variables/attributes as private (cannot be accessed from outside the class).

If you want others to read or modify the value of a private member, you can provide public **get** and **set** methods.

Encapsulationin C++ is defined as the wrapping up of data and information in a single unit.

1. **Data Protection:**Encapsulation protects the internal state of an object by keeping its data members private. Access to and modification of these data members is restricted to the class’s public methods, ensuring controlled and secure data manipulation.
2. **Information Hiding:**Encapsulation hides the internal implementation details of a class from external code. Only the public interface of the class is accessible, providing abstraction and simplifying the usage of the class while allowing the internal implementation to be modified without impacting external code.
3. We can not access any function from the class directly. We need an object to access that function that is using the member variables of that class.
4. The function which we are making inside the class must use only member variables, only then it is called *encapsulation*.
5. If we don’t make a function inside the class which is using the member variable of the class then we don’t call it encapsulation.
6. Encapsulation improves readability, maintainability, and security by grouping data and methods together.
7. It helps to control the modification of our data members.
8. People often consider encapsulation as data hiding, but that's not entirely true.
9. Encapsulation refers to the bundling of related fields and methods together. This can be used to achieve data hiding. Encapsulation in itself is not data hiding

Data hiding is a way of restricting the access of our data members by hiding the implementation details. Encapsulation also provides a way for data hiding.

We can use access modifiers to achieve data hiding in C++.